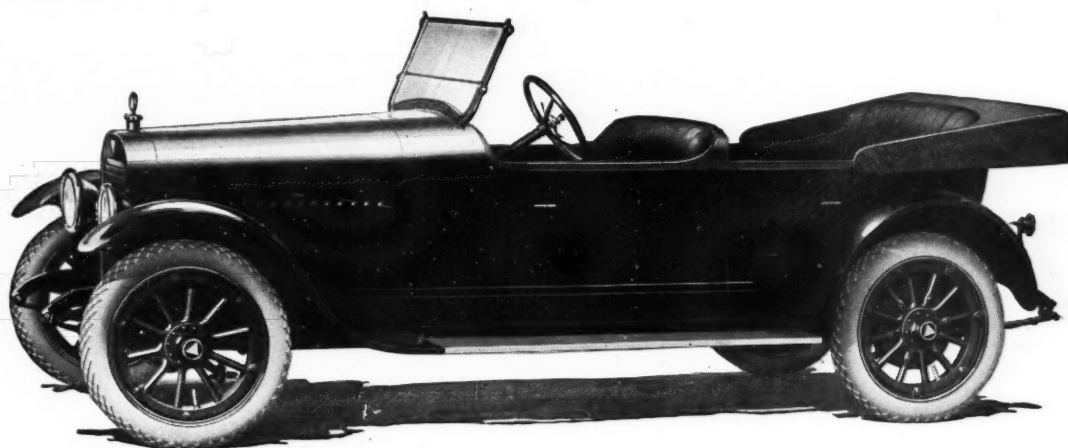


MOTOR AGE

Vol. XXXI
No. 19

CHICAGO, MAY 10, 1917

Ten cents a copy
Three dollars a year



New Super-Six Speedster

Another Fast Selling Hudson

The newest Hudson Super-Six model is a 4-passenger Speedster.

It is bringing new business to Hudson dealers, just as the first Super-Six did.

Even before Hudson Dealers were told anything of its details, even without advertising or announcement of any kind, customers placed orders to assure early delivery.

No description of the Speedster nor any assurance of definite delivery dates was given. Still the orders continued to increase.

And why shouldn't there be such a demand for a Hudson Super-Six Speedster? Everyone knows of the official record of a stock Super-Six chassis in traveling a measured mile at the rate of 102½ miles an hour. And all motorists are familiar with other wonderful performances of the Hudson Super-Six. The Super-Six has proved it has just the qualities you would require in a Speedster.

There could be no concern about the beauty or grace or finish of the body. The artists responsible for such lines as are revealed in the Super-Six Phaeton, the grace of the Hudson Super-Six Limousine, and the daintiness of the Town Car, could be relied upon to design the smartest Speedster.

You must acknowledge its low sweeping lines, its rich cobalt blue body with vermillion wheels, the smartest Speedster you have ever seen.

Hudson cars are easily sold.

That is why live dealers seek its representation



Phaeton, 7-passenger . . \$1650
Cabriolet, 3-passenger . . 1950
Touring Sedan 2175

Speedster, 4-passenger . \$1750
Town Car 2925
(All Prices f. o. b. Detroit)

Town Car Landaulet . . \$3025
Limousine 2925
Limousine Landaulet . . 3025

HUDSON MOTOR CAR COMPANY
DETROIT, MICHIGAN



Van Sicklen

ELGIN

SPEEDMETERS

Record changes of speed
instantly—not after a thous-
and or more feet of travel

*Prices and Specifications
Mailed on Request*

*The Van Sicklen Company — Elgin Illinois
Factory — Elgin National Watch Co.*

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every city in which your
make of car is sold

MOTOR AGE

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ANNOUNCEMENT

The feature of Motor Age for next week will be a story on "Trailing a Trailer Through the Rockies." This article was written by one who last summer was doing this. It shows the possibilities of the trailer under different conditions.

Down the avenue of palms...

—where the tropic sun is tempered by soft sea breezes there flows a mighty army of motors drafted from the \$2000 class and upwards.

The type of car seen at the fashionable resorts generally carries a top of

Genuine Pantasote

This top material withstands the fiercely beating rays of tropical suns as staunchly as it does the frost, sleet, and snow of northern winters.

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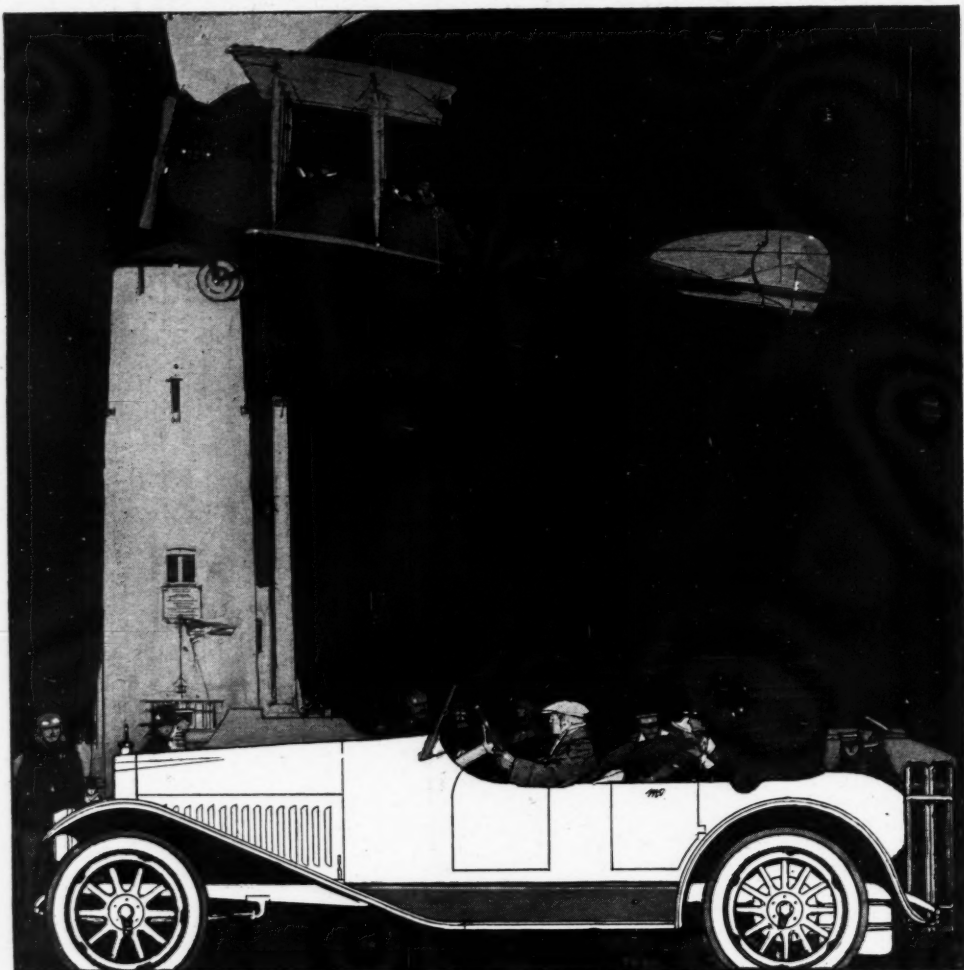


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THE Sixteen-Valve Four is an important step forward in the new trend of power plant development — utilizing the full *capability* of each cylinder rather than mere *multiplication* of cylinder units. Power and flexibility have been obtained by the simplest means.

In the new White motor, four cylinders accomplish the result of two or three times this number. Performance is even more satisfactory because of greater freedom from complications and is indefinitely *maintained at its best* by the simplicity and ruggedness of the four-cylinder type.



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MOTOR AGE

Nature's Rendezvous

By William K. Gibbs

Colorado's Rockies as Seen

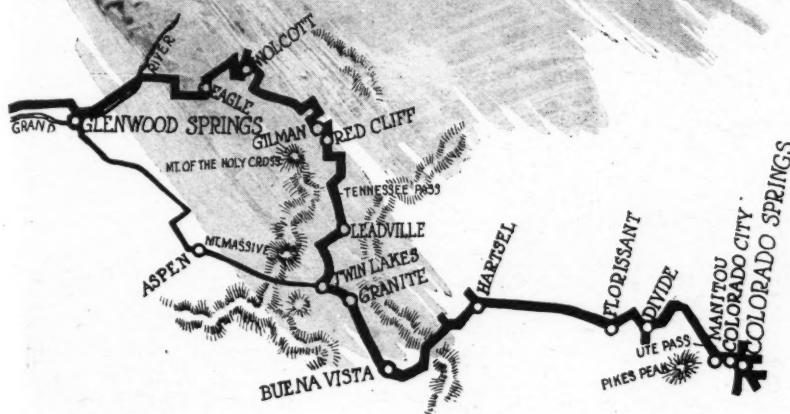
from Pike's Peak Highway

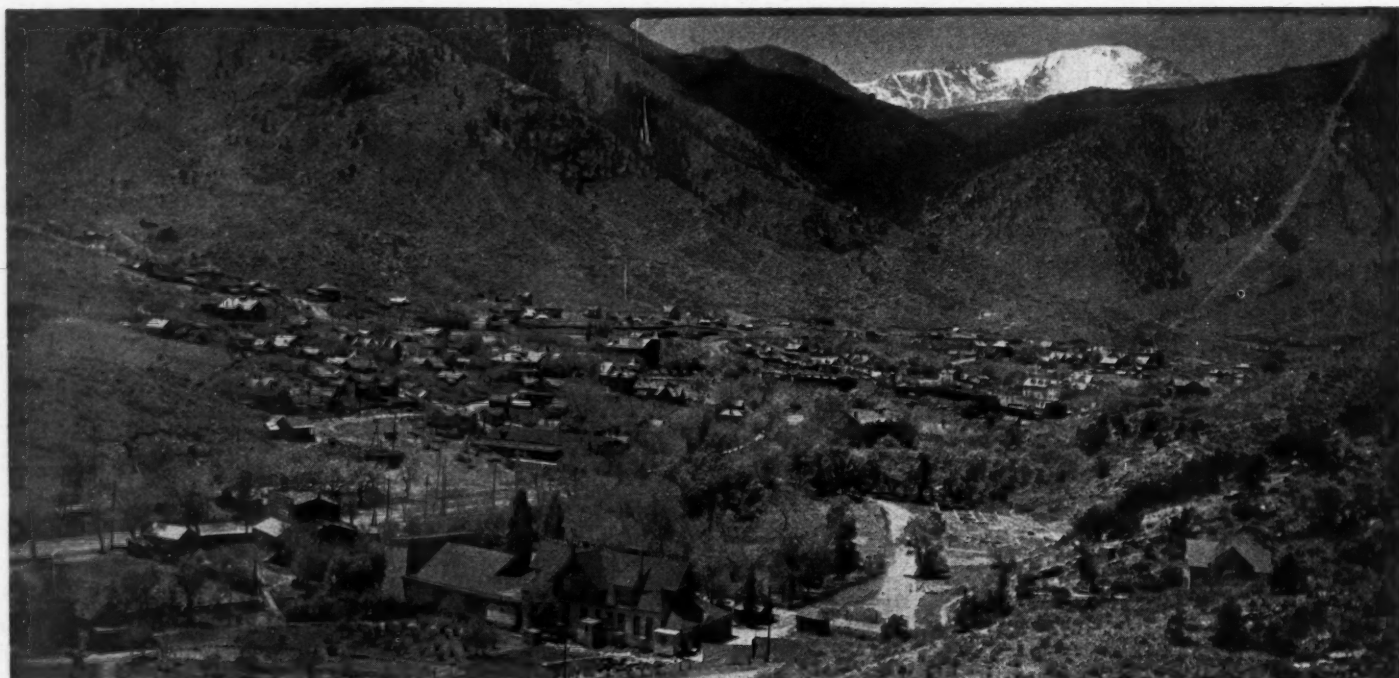
Between Colorado Springs
and Glenwood Springs

In Two Parts—Part I

PICTURED on the screen of everyone's memory is some one scene of which they like to dream. This picture has nothing in common with the myriad thousands that go to make up the film of experience; it is as if at this one point the projector of life's movie drama stopped the film and let the light burn the particular scene into the screen of memory to remain there indefinitely. Perhaps the scene of which you dream is in some place wholly foreign to mine, but the feeling is the same; you like to tell others of this place, which to you, seems the acme of your mental pictures. Just now as the warmth of spring is adding a touch of color to the immediate scene my dreams carry me back to my vacation days of last summer, especially to a 225-mile tour from Colorado Springs to Glenwood Springs, Colo., over the Pike's Peak Ocean-to-Ocean highway, which took my wife and myself through what I have chosen to term: "Nature's Rendezvous."

I know now why Nature was not more generous with Kansas when it comes to physical beauty—she was so busy to the west of Colorado Springs that western Kansas was slighted. Colorado's Rockies show the lavish hand of Nature; verily here is her treasure room, grand and imposing as such a treasure room should be, some of its walls blatant with color, others exquisitely tinted. On the floor are placid lakes, raging rivers, lava and fossil beds, enough different kinds of flowers to make up a text book on botany, snow, thunder, lightning, an occasional rain which many times is seen and not felt, while under the surface of this floor is gold, silver, lead, zinc, iron, coal and almost every known metal.





Manitou, Col., nestles in the canyon at the foot of Mount Manitou and at the beginning of Ute Pass, the gateway to the Rockies from the Colorado Springs section. At the extreme right is the incline railway up Mount Manitou, which rises 2600 ft. in 1¼ miles, the elevation at the upper termini being 10,000 ft. In the background is the summit of Pike's Peak, 14,109 ft. above sea level

Imagine crossing the Kansas and Nebraska prairies with the temperature at 105 in the shade and no shade; then two days later find a welcome steam radiator in your hotel room doing its best to keep you comfortable from a 35-deg. chill of an evening at the top of the world. Such was our experience. July, 1916, sealed the Middle West, and made a mountain vacation especially welcome. Ours was especially welcome, for Chicago as a "melting pot" surely was living up to its name.

We reached Colorado Springs early in August. Officials of the Pike's Peak Ocean-to-Ocean highway held the lure of a two-day drive from Colorado Springs to Glenwood Springs before us, for which I shall always thank them, but the picture they painted of what we would see was mediocre compared with what we really did.

Beginning of the Trip

With W. H. Pearce of Colorado Springs as our pilot we started early in the morning for Leadville, our first night's objective. As we swung out from the Antlers Hotel, Colorado Springs' fashion place, Pike's Peak towered in front of us with Mount Manitou, Cameron's Cone and Cheyenne Mountain standing like three sentries in the foreground. First came Colorado City, which requires a surveyor to determine where it begins and Colorado Springs leaves off. This is not much more than a one-street town, but it boasts the first capitol of Colorado, now not much more than a shack and never very imposing; certainly possessing none of the elaborate features of the present capitol building in Denver on the steps of which is a tablet which shows you when you are exactly one mile above sea level. In Colo-

rado City are numerous gold smelting and reduction plants.

Out of Colorado City and before reaching Manitou we came to the Garden of the Gods, which requires a story in itself and cannot be dwelt upon here except to say that here is a rock formation quite unlike



Mount Massive, always snow-capped, is Colorado's highest peak. This view from Pike's Peak highway is from a point a few miles south of Leadville

that to be found elsewhere in that vicinity. It is mostly red sandstone and the water and wind have chiseled various human and animal forms out of the rock, which can be recognized without any very vivid imagination, although the better the imagination the more you see. Next came Manitou, which reminds one more of a street fair than a town. In summer its population is something like 5000 to 8000 persons; in winter, not over 1300. It is strictly a summer town and curio stores with mineral and Indian souvenirs as their wares thrive on the tourist traffic. Here the cog road up Pike's Peak begins, there are mineral and soda springs and just to the East of Manitou are replicas of some cliff dwellings of the Great Southwest.

Just out of Manitou we came to Ute Pass, the theme of many historic and legendary tales. A well-worn trail, made by the moccasined feet of the Ute Indians, is said by historians to have been cut down this pass hundreds of years before Columbus discovered America. It was through this pass that the tide of gold seekers swept over the range in the early days of Leadville and Aspen. To-day the road has been rebuilt by convict labor and its condition is best told by the illustration at the beginning of this story.

Ever-Changing Scenes

Cascade nestles snugly at the upper end of Ute Pass and it is here that the new highway to the summit of Pike's Peak begins. We circled around the "Sentinel of the Rockies" through Green Mountain Falls, Crystola and Divide to Florissant. Easy grades and good road, with an ever-changing scene, here and there great jagged rocks, a rushing brook, a thicket of pines, all coupled with the crisp mountain air

crowded out all thought of Illinois prairies and the sultry Chicago weather we had left only a few days previously. Between Divide and Florissant we got a glimpse of the Sangre de Cristo range to the southwest and, stretched like a white ribbon before us, apparently but a few miles away yet really nearer 100, we saw through the shimmering blue that always is evident in high altitudes the snow-capped crest of the Continental Divide. Although we saw it in the early morning we did not reach it until late in the evening.

At Florissant we visited the fossil beds and procured some specimens of ferns and other plant life embedded in between the stratas of slate rock. These fossil beds are well picked over and for those who are more interested in buying than looking for specimens there are many children looking for the tourist's dime or quarter in exchange for more or less rare specimens.

Forty-seven miles out of Colorado Springs we came to the top of Pulver Divide and breaking over the crest of this point we caught our first sight of the South Park reservation, a broad expanse of prairie that seems all out of place in the rugged surroundings. At first glance I would have said it was not over a mile across the plain, but I watched the speedometer tick off more than 10 miles, the road running almost in a straight line the entire distance. It is not such a road as you would expect to see. Grass grows all over it except in the wheel tracks, but at that it is very smooth and easy to ride over. On the west side of the reservation we came to Hartsel and although we had driven but 63 miles

our appetites did justice to such a spread at a wayside farmhouse as I never would have expected to find in such a locality.

Skirting the Continental Divide

Climbing out of the South Park reservation the road is rather steep and follows an abandoned narrow-gauge railroad most of the way. This railroad had been largely destroyed by the river, only a few rails here and there indicating that this once was the course of train travel. The winding road that brought us down into Buena Vista seems like it was very undecided about ever getting into this city, which, translated from the Spanish means, "Beautiful View." Its name needs no explanation to those who have seen the city. It lies at the base of the Collegiate range—three peaks known as Harvard, Princeton and Yale, and each higher than Pike's Peak—in the valley of the Arkansas river. We met an old lady just as we were coming into Buena Vista who imparted the information to us that she was the oldest living white inhabitant in Colorado. Even were it possible to tell the age of the feminine sex by teeth, her case would have been hopeless—she had none. Age is personified in the Rockies. You look at the towering peaks, the water and wind-worn crags and you think how puny and how modern you are in a land where these beauties have been evident for untold centuries.

Up the valley of the Arkansas we drove through Granite to Leadville, 38 miles. It was a long climb, sometimes on one side of the river, sometimes on the other and all the way the snow-capped Continental Divide towered above us on the west. As the

sun crept behind the glistening peaks the mountains were set off in bold relief, the outline seeming edged with gold which reminded us of the untold wealth of minerals lying beneath these great upheavals of rock. As we continued climbing we continued to get colder until, when we reached Leadville, the August evening seemed more like November to us who were used to lower levels. The radiator in our hotel room in Leadville gave forth a friendly hiss of steam as we were piloted in by the bellboy. Steam heat in August, especially after sweltering in 105-deg. Kansas sun a few days before, seemed out of place, but we were grateful for it; yes and sweater and overcoats besides. No recounting of the trip from Buena Vista to Leadville would be complete without mention of Twin Lakes. Here are two bodies of water, closely connected, that surprise the tourist as he gets his first glimpse of them. This is a popular touring Mecca for the people of this section.

Some one has sung a question with reference to Leadville as follows:

*"Did you ever hear of Leadville town,
High up on the Great Divide?*

*A gem set in the continent's crown—
A hive on the mountain side;*

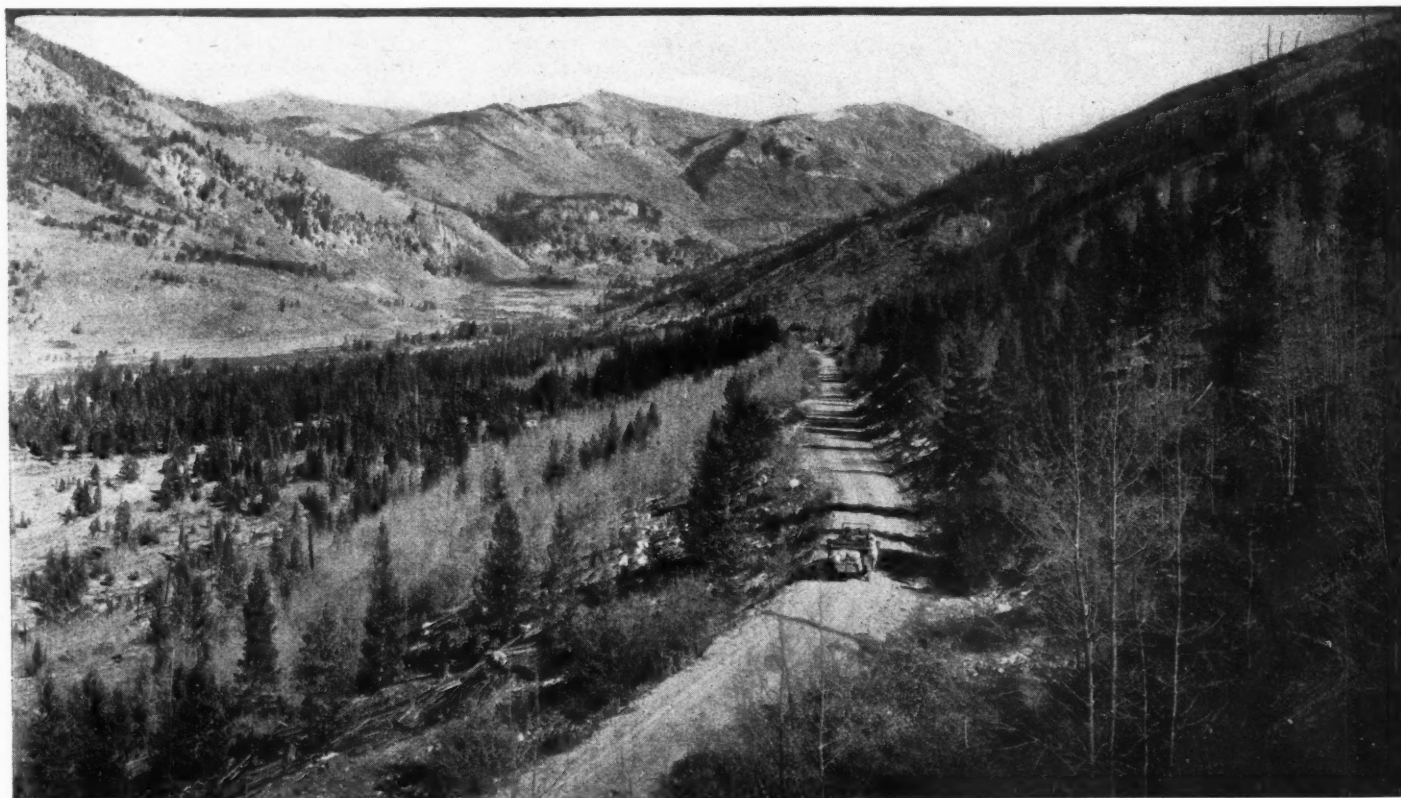
*Where the summers are cool and the
air is clear,*

*And there's life in the frost-bite
breeze—*

*Well, hope and health and wealth are
there*

*'Mid the breath of the old pine
trees."*

Leadville was founded in 1859 as "California Gulch." It came into importance



Down the western side of Tennessee Pass. Dropping over to the side where all streams head Pacificward, the scenery becomes more rugged, but the Pike's Peak highway grades are comparatively easy



High brow road between Buena Vista and Twin Lakes. Hewn out of the mountainside, this road is cracked but good. The Denver and Rio Grande railroad and the Arkansas river are far below

from gold washings and in 1877, on the discovery of vast beds of silver carbonate, became one of the most famous mining centers in the world. Its annual yield of silver is very large and it has important smelting furnaces and reduction works.

Leadville of yesterday and of today are totally different. Once the typical frontier mining town, peopled by almost every nationality except the Chinese—the celestial never was welcome in Leadville—it has changed to a more staid city, although it has lost much of its population. In boom days the streets were crowded and one went with the crowd; today it has a population of approximately 10,000, as against 40,000 in the pioneer days.

Leadville of Old

We reached Leadville about dusk, were turned over by our host of the day to our host of the morrow—Tommy Kyle, assayer, mining engineer, stockholder in the Ibex mine, one of the richest in the state and a host par excellence—and after thawing out, for the high altitude had chilled us like late November in Chicago—Leadville is the highest incorporated town in America; 10,200 ft.—were ready for dinner and to learn of this bonanza city which, with Cripple Creek, take precedence over any other cities of Colorado as mining towns. Our hotel, no doubt, was once a show place of the town; certainly it is well furnished, had mammoth rooms and good service, but I was quite surprised to learn that one could not eat there. We were directed to a good restaurant across the street. It is. We learned much about Leadville during that evening. What we were told made me wish I might have turned back the hands of

time to those early days when it must have had something of the atmosphere which smacks of William S. Hart and the movies. In the days of yore the citizens did not lack for amusement for variety theaters, beer, dance and gambling halls were wide open and one could see as good vaudeville performances as could be given in New York at that time for the simple reason that the talent came to Leadville because there they were paid the highest salaries in the land. In those days money was the most plentiful thing in Leadville. Pioneers tell of the time when the Woods Opera House

opened and a girl made such a hit that she had money enough thrown at her on the stage to make her rich.

Gambling was rife in the pioneer days. In one of the gambling halls there was a sign across the face of the large clock reading: "Don't Swear." Below the clock on a specially-made desk was always an open Bible. This house was run by Pap Wyman who was the first man to light his building with electricity. Many of the ignorant thought he was possessed of the devil. He was an eccentric character, and before the city was platted he built a log cabin, which, after surveying the city, was found to be in the very center of the intersection of two streets. He made an arsenal of it for several days before he was dislodged.

One of the most luxuriantly appointed gambling houses in the country was "The Texas." Every room was supplied with a piano and a musician to play it. On the opening night the proprietors gave a dinner that is said to have been the finest ever given in the West, and the guests attending represented capital amounting to \$80,000,000.

Many of the thespians that have since gained fame got their start in Leadville. The King Midas touch made Leadville the more modern Aladdin's lamp. Again the poet says:

Here the miner rends from its granite bed.

*Old Nature's golden store,
And Vulcan's furnaces are red
With the glare of molten ore.*

*Here the turquoise sky and the crisp,
dry air*

*To the pallid cheek brings health,
And the giant mountains everywhere
Are seamed with the Inca's wealth.*



Castle Gate, between Harsted and Buena Vista. The colorings of these rocks are as variegated as the rainbow



Going down Eagle Canyon into Red Cliff. In the foreground is Battle mountain, the light streak across the face of the mountain being a part of the Pike's Peak highway rising out of Red Cliff

Enough of the past. Leadville of today is not without its interest. It is a great mining center with an inexhaustible supply of ore. I'm not a mining expert, but I say inexhaustible supply with a little more ease by reason that I explored the Wolf-tone zinc mine. When I confessed I never had been deeper in the ground than the second sub-basement of a Chicago department store, some one opined that I would like to go down into the bowels of the earth exploring. Having once been up nearly a mile off the earth, going down into it had no terrors for me. I was not so sure about accepting for my other half, but it was not necessary for she did it for me.

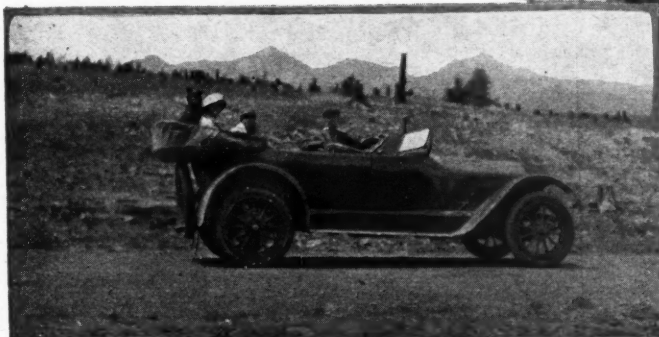
The Mine Exploration

Morning of the next day found us ready to go down into the ground from whence we did not know if we should return, but which we fully expected to do. If greasy overalls, jumper and cap make a miner, I was one. We certainly did not look like tourists when we got into the cramped quarters provided by the lift that lowered us down, down into inky blackness to the accompaniment of a shower bath. The shaft, was oozing water, which I was told was common. Some nine or ten hundred feet down we stopped—we were told we were that deep in the earth so we took our guide's word for it—and sometimes stooping to avoid hitting our heads, at other times in mud nearly ankle deep, we traveled about and were shown machinery down there that looked

as if it would be beyond human power to have gotten down the cramped shaft in which we were lowered from the surface. However, it was brought down, piece by piece and set up. We met a man down there, his name does not matter, who has been working down in that mine for thirty years, and he is over seventy. There must be something preservative of humans about that mine for he did not look over forty.

More or less soiled we came to the surface, lugging specimens which, added to the collection from Cripple Creek and other places, made busboys and porters look for an extra tip when we came back to Chicago. Mr. Kyle, who was our host for the remainder of the trip to Glenwood Springs, took us in charge about 11 o'clock and, together with Miss Addie Cook, of Leadville, we headed for Tennessee Pass, a climb of several hundred feet from Leadville.

Looking back, Leadville spread before us, glistening under the bright sun, its mines and smelting plants personifying it as a wealth producer; not the Leadville of yesterday, but a model city in every respect.



At the left is the scene in Tennessee Pass with the peaks along the Continental Divide showing in the background. At the right is the shaft down which we went into the Wolfstone zinc mine

Standing at the top of the Continental Divide may have no special charm for you, but it did for me. Here I stood on the backbone of the continent about which I learned in a little log schoolhouse in Michigan many years ago. Here Nature heads the drops of water that go to make up the rivers on their respective ways, but going up or going down, one side or the other of the Divide, it matters not for Nature is there in all her pristine glory. Here is her storehouse—her rendezvous, if you please.

Switchbacks brought us to the top of the Divide, Tennessee Pass; switchbacks carried us down the other side. The hum of the National Twelve, the exhilarating air, the unfolding scene from which the curtain was being withdrawn as we sped along and interesting hosts left nothing to be desired.

I learned on this strip for the first time that the blatant colorings of the Rockies as depicted on souvenir post cards were not mere flights of fancy on the part of the artist. These colors are real. As we dropped down the western slope of the Divide on a road that will stand comparison with some of our best touring roads in the plains states I conceived the title I have given this story and every turn of the road during the remainder of the day made me more sure that the title was appropriate.

(To be concluded)



WILLYS A CURTISS DIRECTOR
Toledo, April 10—John N. Willys has been elected a director of the Curtiss Aeroplane and Motor Corp. to succeed H. Saure Wheeler, resigned. The Willys-Overland Co. recently contracted with the Curtiss company to manufacture 4,500 airplane engines for the United States government.

Protest Five Per Cent Tax

Proposed Motor Car Levy Discriminates and Is Too Severe

WASHINGTON, D. C., May 7—The duel between the Ways and Means Committee and the motor car industry on the 5 per cent tax against motor cars to be paid by the manufacturers continues. The Ways and Means Committee is determined to incorporate the 5 per cent tax as a part of the measure, and before this reaches many readers it may be the bill will be reported to the House incorporating this discriminating tax.

The motor car industry, through the National Chamber of Commerce, Inc., has been opposing the measure and Alfred Reeves, the general manager, is spending a good deal of his time in Washington, representing the industry and endeavoring to secure only equitable taxation against the industry. The motor car industry objects to this tax on the ground that it is a discriminating tax and not levied against other industries.

For example: If the motor car and motor truck manufacturers have to pay a 5 per cent tax on the selling price of their vehicles, then why should not the manufacturers of wagons, buggies, trolley cars, railroad passenger cars, railroad freight cars, barges, steamboats, private yachts, etc., pay a similar tax? Why should not the manufacturer of airplanes and any other vehicle

used in transportation pay a similar tax?

This is the information the motor car industry would like. The industry is patriotic to the core. It realizes the country is in war and that \$2,000,000,000 per year must be raised to defray this war cost. The industry must pay its share, and is willing to. The manufacturers of cars, trucks and accessories are willing to pay their equal share of the excess profit tax, which may range from 8 to 15 per cent, the same as in other industries. The leaders of the industry are willing to pay any increased income taxes, personal taxes, etc., but cannot see why so necessary an industry should be called upon to pay an entirely additional tax such as this 5 per cent one which has been drafted by the Ways and Means Committee.

Car Not a Luxury

This committee seems to have decided upon this tax on the ground that the motor car industry is a luxury industry; on the ground that the motor truck industry is not an essential industry but a luxury industry; on the ground that the man buying a motor car, be he a doctor, a salesman or a business man, buys it for luxury purposes and not for necessity. Such a contention is impossible. Unfortunately political Washington gages the industry by the annual statement of the Ford company. The \$59,000,000

profits from Ford last year seems to have turned the heads of some members of this committee. The committee perhaps does not realize that the Ford profits this year may not be one-sixth of this amount. The committee fails to realize that of the 450 motor car manufacturers in the country 12 per cent of them produce 80 per cent of the cars made. Turning these figures around we find that 438 motor car makers produce but 20 per cent of the cars manufactured. Naturally these 438 makers are not so strong financially as the twelve companies that build 80 per cent of the product. It is not fair to base the entire industry on the Ford statement. It is not fair to base the entire industry on the statements of the ten leading companies in the industry. If we do this the 438 others will be taxed too severely.

The National Automobile Chamber of Commerce has submitted to the members of Congress a brief on the industry with the hope of opposing this taxation. The brief in addition to showing that twelve manufacturers produce 80 per cent of the cars shows that a 25 per cent increase for labor and material has been put on the industry. During the last five years over 600 motor car manufacturers have failed financially.

The complete brief follows:

Facts Regarding Motor Car Taxation

TO THE MEMBERS OF CONGRESS:

MOTOR CAR MANUFACTURERS WITHOUT EXCEPTION, DESIRE TO PAY THEIR FULL FAIR PROPORTION OF THE GOVERNMENT'S EXPENSE. They want to be taxed fully and in proportion to all other industries.

They do object to having double taxation imposed upon them, or any form of taxation that may put dozens of them out of business.

THERE ARE 450 MOTOR CAR MAKERS IN THE UNITED STATES OF WHICH TWELVE MAKERS PRODUCE 80 PER CENT AND 438 PRODUCE 20 PERCENT OF THE WHOLE. The twelve have been prosperous while the bulk of the others are able to exist only in good times. The prosperity is due to increasing volume, the reverse occurs when the volume shrinks.

Since war was declared the volume of sales has been seriously affected. This condition continued will change the volume and hence the profits.

TO TAX FURTHER AND INDIVIDUALLY AN INDUSTRY WITH SUCH A CONDITION EXISTING, IS UNFAIR AND UNJUST. Such a tax would have to be absorbed by the maker. Any advance on a declining market would further restrict sales and hence volume.

THIS CONDITION WOULD MOST SERIOUSLY AFFECT THE SMALL AND THE FINANCIALLY WEAK COMPANIES.

THIS INDUSTRY HAS BEEN OBLIGED TO INCREASE ITS COST FOR LABOR 25 PER CENT AND MATERIAL

MORE, as indicated in the appended list. These costs have been overcome to some degree only by the great volume.

These increases were:

	Per Cent
Sheet aluminum	40
Steel castings	30
Bearings	35
Aluminum castings	50
Leather	30
Stampings	75
Sheet steel	65
Tungsten steel	400
Steel tubing	40
Iron castings	35
Forgings	75

THE MOTOR CAR INDUSTRY COMPRISES APPROXIMATELY 450 MANUFACTURERS AND 825 MAKERS OF PARTS AND ACCESSORIES. THERE ARE 25,924 DEALERS AND 23,686 GARAGES THROUGHOUT THE COUNTRY, all depending on the products of the makers of motor cars.

FEW OF THE 450 MANUFACTURERS ARE, WE BELIEVE, AVERAGING TO EXCEED 12 PER CENT PROFIT ON THEIR TURNOVER. THE 5 PER CENT TAX WOULD, THEREFORE, TAKE FIVE-TWELFTHS OF THEIR PROFITS—assuming the tax cannot be passed on to the consumers—which would equal five-twelfths or 41.6 per cent of the profits of the trade as a whole.

It would be the equivalent of a tax of 41.6 per cent on entire net profits.

THE 5 PER CENT TAX CANNOT GENERALLY BE PASSED ON TO THE CONSUMER. It is impossible to advance prices on a falling market. Very few manufacturers after paying this 5 per cent tax would have anything to pay under the excess profits tax. Their profits remaining, if any, would be less than 8 per cent of their investment.

THE OFFICIAL REPORTS SHOW NAMES OF MORE THAN 600 MOTOR CAR MANUFACTURERS THAT HAVE FAILED DURING THE LAST FIVE YEARS.

We believe that not more than one-half of our motor car manufacturers are breaking even. Few are making in excess of 10 per cent on their turn over.

Material costs have gone up and are going up enormously.

Prices have been driven to absolute top notch by high material and labor costs.

Profits are probably not more than three-fourths what they were a year ago.

DURING THE PAST YEAR, EXCLUDING FORD, 80 PER CENT OR FOUR-FIFTHS OF ALL NEW CARS WERE SOLD TO PEOPLE WHO ALREADY OWNED CARS AND TRADED

THEM IN. If the 5 per cent tax is imposed, THESE PEOPLE WILL LARGELY KEEP THEIR OLD CARS INSTEAD OF REPLACING THEM WITH NEW. Manufacturers will suffer seriously in their sales AND THE GOVERNMENT'S PROPOSED REVENUE FROM EXCESS PROFITS TAXATION WILL NOT MATERIALIZE.

THE MOTOR CAR BUSINESS HAS ALREADY SUFFERED CURTAILMENT THROUGH THE DECLARATION OF WAR. Several thousand men have already been released from employment.

People will not freely buy motor cars in war times, or under heavy tax conditions.

Manufacturers have already begun to curtail output, which means manufacturing costs will go up inevitably. Reduction of output does not correspondingly save overhead which, next to material, is the largest element entering into the manufacture of cars and trucks.

We offer our services to supply further information and details regarding the statements made herein.

NATIONAL AUTOMOBILE CHAMBER OF COMMERCE, Inc.

ALFRED REEVES,

General Manager.

GOVERNOR OBJECTS TO TAX

Detroit, May 7—Governor Sleeper has telegraphed to every Michigan member of Congress a request that he protest most vigorously against the proposed 5 per cent tax on motor car purchase prices and has requested Congressman Fordney, a member of the House Ways and Means Committee, to make a minority report. This action followed a conference between the governor and R. E. Olds, president of the Reo Motor Car Co. of Lansing. Mr. Olds stated that a 5 per cent tax on the purchase price was a 40 per cent tax on profit and would mean the closing of many factories and the curtailment of work in many others. He also pointed out that Henry Ford was the only maker in Michigan who would not be hit by the tax. Ford, according to Mr. Olds, has in his contracts for this year a clause which makes all government taxes payable by the agent and not by the maker.

MOTOR MEN RECEIVE COMMISSIONS

Washington, May 5—Henry Souther, past president of the Society of Auto Tire Engineers, and recently consulting engineer, office of the chief signal officer in the War Department, is to be commissioned a major in the aviation corps.

S. D. Waldon, formerly with Packard and Cadillac and for some time active in government aviation work, has been commissioned a captain in the aviation section of the Signal Corps.

W. H. Hutton, formerly Timken-Detroit purchasing agency, has been commissioned a major in the Quartermasters' department, where he probably will have to do with the inspection and purchase of motor trucks. S. P. Wetherill, Jr., administrative and chemical engineer, has been made a major also in the same work.

Others Enter U. S. Service

Lieutenant F. B. Massey, transportation engineer of the United States Motor Truck Co., has been recalled for service by the

government and has reported to the Boston navy yards.

R. Clifford Durant, son of W. C. Durant, president of the Chevrolet Motors Co. and the General Motors Co., has volunteered for service in the aviation branch of the signal corps.

ZIMMERSCHIED AT WASHINGTON

Detroit, May 5—K. W. Zimmerschied, chief metallurgist of the General Motors Co., has been given a furlough by his company and is now in Washington in charge of the new office there conducted by the Society of Automobile Engineers.

TEN MORE PRICE RAISES

New York, May 7—The following list will give the changes to date that have taken place in motor car prices lately. This list does not include those changes that have already been announced in these columns.

MAKER	MODEL	OLD PRICE	NEW PRICE
Mitchell	D-40 2-Pas.	\$1,150	\$1,195
Mitchell	D-40 5-Pas.	1,150	1,195
Stephens	60-65 2-Pas.	1,150	1,250
Stephens	60-65 5-Pas.	1,150	1,250
KisselKar	6-42 5-Pas.	1,700	1,750
KisselKar	6-42 Sedan	2,050	2,100
Luverne	17	1,500	1,650
Simplex	Chassis	6,000	7,000
Glide	6-40 5-Pas.	1,250	1,295
Glide	6-40 Sedan	1,450	1,495
Pullman	2-Pas.	850	910
Maibohm	2-Pas.	695	795

Savannah, Ga., May 5—The Dort Motor Co. has announced an advance of \$30 in the price of the Dort, effective April 25. Another advance is predicted shortly.

New York, May 4—The Autocar Co., Ardmore, Pa., today raised the price of its chassis to \$1,815. The former price was \$1,650. The bodies have gone up approximately 10 per cent in price. This company reduced its list price on the chassis in March, 1915, from \$1,850 to \$1,650.

AVIATION TRAINING CAMPS

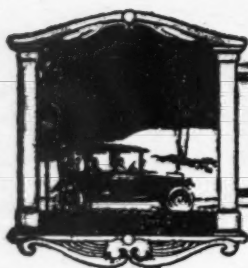
Washington, D. C., May 4—The signal corps of the War Department, on recommendation of the aeronautic division of the Council for National Defense, has selected ten sites for aviation training camps, which number may be increased to twenty. Most of these camps will be opened by July 1.

Plans are being made to send a corps of American aviators to the French front soon. Those assigned for this duty will be drawn principally from the training camps at Mineola, N. Y., Newport News, Va., and San Diego, Cal.

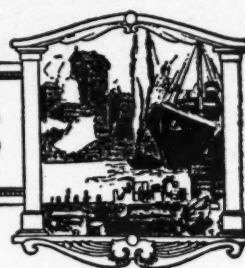
The following institutions have been designated as training schools for army aviators: Cornell, Illinois, Ohio, California and Texas state universities, and the Massachusetts Institute of Technology. The designations were made after a conference between the aeronautics division and college representatives from throughout the country. Aviators will assist faculty instructors. Each of the schools will send three faculty members to study practical aviation problems at the Canadian training school at the University of Toronto. Ohio State University has made arrangements to use a string of ten aviation fields between Columbus and Dayton, which are being established by a Dayton airplane company, the two cities to be terminals of a regular flying course.

3000 AMBULANCES TO FRANCE

Washington, D. C., May 4—The United States will send 3000 ambulances and 7700 doctors and drivers to France, the Council of National Defense announced yesterday. The first unit of twenty-two ambulances and seventy men will leave within three weeks. This is in addition to the six medical units, comprising about 1000 medical men, which will be sent at once to Great Britain.



EDITORIAL PERSPECTIVES



Used Car Problems

THE Milwaukee motor car dealers are to be congratulated on their used car show which demonstrated two or three points with regard to the used car industry. This is progress. It is to be hoped the used car show in Chicago this week will show similar progress. No greater problem confronts the motor car dealer to-day than that of handling the used car situation.

ONE of the important results of the Milwaukee show was that it demonstrated a used car will sell better if repainted and made to look reasonably modern and up-to-date by a few dollars' worth of paint and varnish. At the Milwaukee show cars so renovated were ready sellers as compared with cars not so fixed up.

SEVERAL dealers in our large cities have known for years that a used car if repainted and revarnished will sell better than one not so handled. These dealers generally have had facilities at hand in their own place of business or in the city to

get this repainting done. There are many small towns without such facilities so that the car dealer in a town of 2000 population is handicapped.

ONE respect in which dealers must exercise care in selling used cars is in getting some knowledge of what it costs to handle a used car. The dealer allows \$350 for the car and is content to sell it at the same price, thinking thereby that he has not lost any money. As a matter of fact he has lost \$25 on such a deal. Averages from scores of dealers shows that it costs this amount simply to handle a used car and keep it on hand for perhaps three weeks or a month. The dealer handling the used car should at once count on adding \$25 to the allowed price in order to break even; if he does some repainting and fixing up he should add \$30 more; and if he undertakes to do a little repairing he will have another \$25 to add. Summing up, the dealer handling a used car and making some pretense at repainting and repairing will have to add approximately \$75.

The Five Per Cent Tax

POLITICAL Washington has decided that the motor car is a luxury. They do not consider it a part necessity and a part luxury, but have classed it entirely in the luxury column. For this reason the Ways and Means Committee of the House of Representatives, which is framing a new war taxation bill, has included a 5 per cent tax on all motor cars and motor trucks manufactured. This tax is to be paid by the manufacturer and paid on the selling price of the vehicle to the dealer.

THE motor car industry has been picked out as the victim of such a tax solely because the industry is considered a luxury industry. THERE IS NO TAX ON PULLMAN CARS at the source of manufacture, although THEY ARE A LUXURY in the same sense. THERE IS NO TAX ON TROLLEY CARS at the source of manufacture, although THEY ARE IN THE SAME FIELD WITH MOTOR BUSES. THERE IS NO TAX ON HORSE TRUCKS OR RAILROAD CARS, ALTHOUGH THEY ARE MOVING FREIGHT THE SAME AS MOTOR TRUCKS ARE. THERE IS NO TAX ON STEAMBOATS WHICH CARRY FREIGHT, OR ANY OTHER TYPE OF VEHICLE WHICH CARRIES FREIGHT, EXCEPT THE MOTOR TRUCK.

IT is unfortunate that the motor car and the motor truck should to-day, now that we are in war, be singled out as special targets for what can be looked upon only as DISCRIMINATORY AND CLASS TAXATION. The motor truck is no more a luxury to-day than is the flat car that carries our lumber on the railroads, than is the horse truck, than is the farm tractor, than is the trolley car, than is the lake steamer. All of these are necessary vehicles of transportation, and if ONE SHOULD BE TAXED ALL SHOULD BE TAXED.

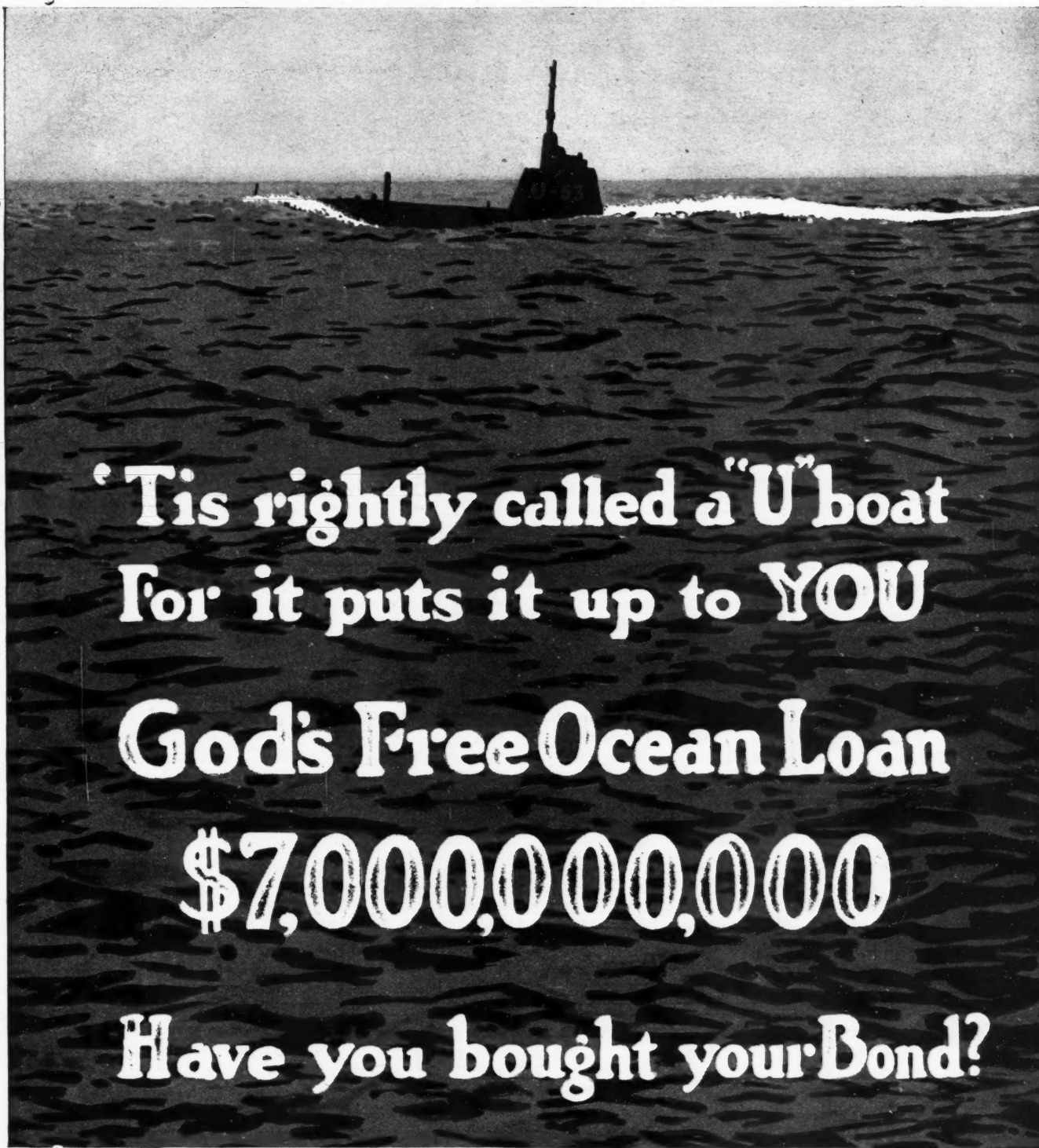
NOTWITHSTANDING the paramountcy of the motor as a vehicle essential in the war of to-day the government through the Ways and Means Committee has made a special onslaught on the industry. It has single out the industry as the one to bear a special burden, A BURDEN NOT LAID ON

OTHER KINDRED INDUSTRIES. The manufacturers in the motor industry, in addition to paying this 5 per cent tax, also will have to pay what is known as the excess profit tax, that is, a tax not definitely settled to-day, but which may be from 8 to 15 per cent of the profits of a concern. In addition to this, the individuals heading motor car companies are paying their income taxes, personal property taxes, etc., and they are all willing and desirous of paying their legitimate share of the war taxation, but they do object to this discriminatory 5 per cent tax placed on an industry which is of paramount importance in the war, when other industries of a similar nature are not asked to bear a similar burden.

EVERY MOTOR AGE reader has a personal interest in combating this 5 per cent tax. You may not be a motor car manufacturer, or you may not be acquainted with one, but you do know that YOUR MOTOR CAR IS A UTILITARIAN BIT OF APPARATUS. It may be just as essential to your business as your telephone or your safe, or your typewriters. As such, you should protest to YOUR CONGRESSMAN IN WASHINGTON. YOU SHOULD PROTEST TO YOUR SENATOR IN WASHINGTON. TELEGRAPH OR WRITE YOUR PROTEST, BUT DO NOT FAIL TO SEND IT. In such a protest make it clear that you, as well as the motor car industry, are prepared to share your equitable load, but you do OBJECT TO A DISCRIMINATING 5 PER CENT TAX WHICH IS NOT PLACED ON OTHER INDUSTRIES.

THE routine of this war tax at Washington is: It is to-day before the Ways and Means Committee, which was asked to draft the measure. From this committee it goes before the House, where there unquestionably will be a prolonged fight. From the House it goes to the Finance Committee of the Senate, where there will be another fight; lastly it goes on to the floor of the Senate where it is hoped there will be a prolonged discussion on it. As a motor car owner you can take your part by reaching your congressman or senator. DO IT.

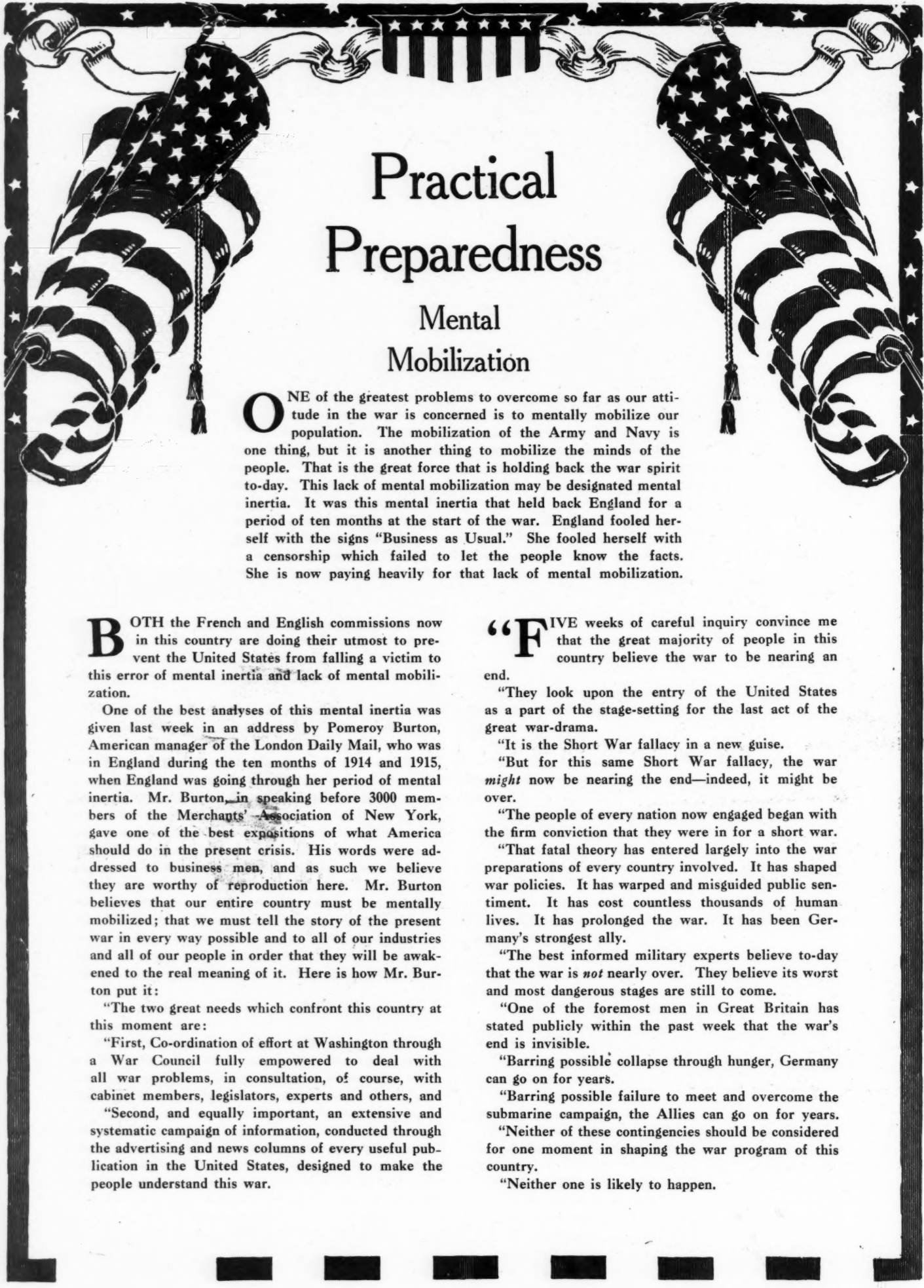
Your Obligation



**'Tis rightly called a "U" boat
For it puts it up to YOU
God's Free Ocean Loan
\$7,000,000,000
Have you bought your Bond?**

YOU have a moral obligation. It is up to you to subscribe to the \$7,000,000,000 war bond issue, which means a per capita subscription of \$70. Bonds are issued in units of from \$100 up. By putting aside \$2 weekly one of these bonds may be purchased in a year. There will be the equivalent of 70,000,000 bonds of the \$100 denomination. Absorbing America's first popular contribution to the expenses of war means that these bonds must be bought by the population of the

United States on the basis of \$100 worth by each one and one-half persons in the country. Our population approximates 105,000,000, and of these millions cannot afford even the \$2 a week necessary to buy one \$100 bond in a year. It is *your* obligation to absorb the surplus. You owe it to the country; to yourself and to those who are dependent upon you. It is to your interest to help America do its share in the world war. Your obligation is now before you—*Meet It.*



Practical Preparedness

Mental Mobilization

ONE of the greatest problems to overcome so far as our attitude in the war is concerned is to mentally mobilize our population. The mobilization of the Army and Navy is one thing, but it is another thing to mobilize the minds of the people. That is the great force that is holding back the war spirit to-day. This lack of mental mobilization may be designated mental inertia. It was this mental inertia that held back England for a period of ten months at the start of the war. England fooled herself with the signs "Business as Usual." She fooled herself with a censorship which failed to let the people know the facts. She is now paying heavily for that lack of mental mobilization.

BOTH the French and English commissions now in this country are doing their utmost to prevent the United States from falling a victim to this error of mental inertia and lack of mental mobilization.

One of the best analyses of this mental inertia was given last week in an address by Pomeroy Burton, American manager of the London Daily Mail, who was in England during the ten months of 1914 and 1915, when England was going through her period of mental inertia. Mr. Burton, in speaking before 3000 members of the Merchants' Association of New York, gave one of the best expositions of what America should do in the present crisis. His words were addressed to business men, and as such we believe they are worthy of reproduction here. Mr. Burton believes that our entire country must be mentally mobilized; that we must tell the story of the present war in every way possible and to all of our industries and all of our people in order that they will be awakened to the real meaning of it. Here is how Mr. Burton put it:

"The two great needs which confront this country at this moment are:

"First, Co-ordination of effort at Washington through a War Council fully empowered to deal with all war problems, in consultation, of course, with cabinet members, legislators, experts and others, and

"Second, and equally important, an extensive and systematic campaign of information, conducted through the advertising and news columns of every useful publication in the United States, designed to make the people understand this war.

"FIVE weeks of careful inquiry convince me that the great majority of people in this country believe the war to be nearing an end.

"They look upon the entry of the United States as a part of the stage-setting for the last act of the great war-drama.

"It is the Short War fallacy in a new guise.

"But for this same Short War fallacy, the war *might* now be nearing the end—indeed, it might be over.

"The people of every nation now engaged began with the firm conviction that they were in for a short war.

"That fatal theory has entered largely into the war preparations of every country involved. It has shaped war policies. It has warped and misguided public sentiment. It has cost countless thousands of human lives. It has prolonged the war. It has been Germany's strongest ally.

"The best informed military experts believe to-day that the war is *not* nearly over. They believe its worst and most dangerous stages are still to come.

"One of the foremost men in Great Britain has stated publicly within the past week that the war's end is invisible.

"Barring possible collapse through hunger, Germany can go on for years.

"Barring possible failure to meet and overcome the submarine campaign, the Allies can go on for years.

"Neither of these contingencies should be considered for one moment in shaping the war program of this country.

"Neither one is likely to happen.

"THE only safe basis for this country to proceed upon is to assume that *the United States* alone is entering upon a war with Germany—a war which will tax its full resources and its entire fighting strength.

"The people would not fail to understand the seriousness of *that* situation.

"They would respond as one man to the call of country, for they would at once realize their own and their country's peril.

"There would be an outburst of patriotism and a rush to the flag such as this world has never seen.

"The people's hearts, souls and bodies would be offered in one grand acclaim to the country's cause—the cause of freedom and human liberty.

"There would be no politics, no divided councils, no false starts, no small handling of great problems, with a great and powerful enemy at the gates.

"No, there would be one grand, overwhelming wave of patriotism and desire to serve which would enlist automatically every ounce of energy and war spirit in the land against the common enemy.

"TO bring it home still more clearly, imagine for a moment the removal of the mighty fleet which has stood as a protecting shield between this country and Germany since the day the war began.

"Would not *that* bring a quick and a full realization of the part the people would be called upon to play in the quick mobilization of the country's whole war forces?

"Well, that is the only correct view to take of this country's responsibilities to-day. And to reach that view quickly the people must be made to understand the war as they do not, I fear, understand it now.

"For instance, they utterly fail to realize that before this war is over, this country may have to put into the firing line, and maintain there, not less than 500,000 fighting men.

"No democracy was ever effective in war without the full understanding and backing of the masses—of the working people.

"Legislation alone will not make this or any other country an effective war factor.

"This country is a long way from the battlefields of Europe, and there is no doubt that great masses of its people feel themselves apart *from* the conflict, not a part *of* it.

"They feel that it is Europe's war, and they do not understand why this country should mix up in it. They utterly fail to realize that the things involved are their own personal freedom, their own material interests, their own and their children's futures—all of which are as much at stake here to-day as they are to the people of England, and of France.

"It must be admitted that the main reason for the utter inability of the people of this country to grasp the true significance of the war to-day is the policy of suppression which has prevailed in the principal entente countries since the day the first shot was fired.

"ENGLAND'S original navy was 150,000. Her present navy exceeds half a million. In addition to the direct naval requirements, England is obliged now to supply all her troops, all her armies in distant parts, with their equipment for war and necessities of life, and in addition she is also obliged to keep huge fleets constantly busy with the transportation of coal and other essential commodities to her allies, notably France and Italy. This means an enormous sea force, in addition to the regular naval force, and the organization and control of this auxiliary navy is one of the great achievements of the war.

"That will suffice to indicate what I mean by the grand scale of preparation.

"No such scale, and consequently, no really adequate co-operation with the Allies in this war, is possible without the full and earnest co-operation of the whole people of the United States.

"I would recommend to those who are shaping the programme for war, as a preliminary to all else, a great and far-reaching campaign of information to make the people understand this war. The school-rooms, the lecture halls, the churches, the libraries, the city halls, the public squares and the movies—all the meeting places of the people in every State of the Union should resound with the voices of America's greatest and most forceful speakers, telling the people—and all of the people—the simple truth, the basic facts about this war.

"This campaign should be conducted on the same scale as if it were a presidential campaign, only the two parties, instead of flooding the country with information about the virtues of one side and the defects of the other, would be joined together in spreading all the facts about the war which it is so essential for the people to know.

"And these war facts, when told to the people, should be printed in every newspaper in the land, and should be distributed as leaflets to every household in every city and town and village of the Central and Western States.

"TELL the story of how the war began, and the facts that went before.

"Tell the story of Belgium.

"Tell the story of the shooting of Nurse Edith Cavell and Captain Fryatt.

"Tell the story of Rheims Cathedral.

"Tell the shocking story of the Belgium deportations.

"Tell the story of the starving prisoners of war in Germany.

"Tell over again the story of the Lusitania, the Arabic and the Sussex.

"Tell the story of the sinking of the Red Cross hospital ships.

"Tell the story of German machinations in this country since the war began.

"Then, and not before then, can the full force of this great country's man power and resources be made effective for war."

Harkness Buys Sheepshead Speedway

Indebtedness Was \$2,135,161.86—To Manage Affairs Himself

NEW YORK, May 4—Whether the Sheepshead Bay speedway will see racing this season or not is undecided as yet, but Harry S. Harkness, who is now in complete possession as a result of the foreclosure auction brought by him, has had several of his racers on the speedway lately, which practically indicates his intentions of entering the 1917 racing events.

Harkness obtained the speedway at the sale on a bid of \$1,300,000. The indebtedness against the property amounted to \$2,135,161.86. Speedway, stands, buildings and extensive grounds were offered in two groups. The first group contains the property exclusive of the speedway; the second, that property embracing the motor-drome, ground, stands, etc. The property was knocked down to Harkness on the above bid finally. Mr. Harkness, it is said, will manage the affairs of the speedway himself.

POSTOFFICE REOPENS BIDS

Washington, D. C., May 4—The Postoffice Department has made announcement that all proposals received in response to the advertisements of March 30, last, for furnishing gasoline motor trucks of 750-lb. capacity having been rejected, sealed proposals for furnishing said chassis as they may be ordered for use of the postal service from time to time of either one month beginning July 1, next, or one year beginning July 1, next, will be received at the Department,

office of the purchasing agent, until 10 o'clock a. m., May 16.

The Department is sending out specifications, instructions to bidders and blanks for proposals in accordance with the above statement.

DISBROW CLOSES CONTRACT

Cleveland, Ohio, May 7—The Disbrow Motors Corp. has closed a contract with E. L. Smith for 250 Disbrow "Special" cars, which is one-tenth of the output for 1917. Mr. Smith will handle the entire Atlantic coast as far south as Richmond, Va., with branches in New York, Philadelphia and Boston. Mr. Smith formerly handled the Sunbeam car.

CHALMERS HIGH-GEAR IN BOSTON

Boston, Mass., May 4—The third high-gear test under A.A.A. sanction was held in Boston, Mass., May 3 and 4. First and second gears were removed from a sedan, and the car was driven for 24 hrs. in the city of Boston. The motor was not stopped during the time. Seventy-five per cent of the time was spent in Boston's down-town traffic district, which is one of the most congested.

H. A. Tarantous of New York was the A.A.A. representative in charge of the test. The official report shows that the car made 188 full stops for traffic and to take on gas, change drivers and passengers. In addition

162 slow-downs for traffic were made, and in all of these the speed of the car was so low that it was necessary to slip the clutch to get under way. The total number of times when it was necessary to slip the clutch was at least 350, an average of almost once every 4 min.

The distance covered was 346.2, an average of 14.4 m. p. h. Extreme care was taken to keep the speed at all times well within the limit permitted by law in Massachusetts and to go no faster than the ordinary driver. While the run was in no sense an economy test, the gasoline mileage was 11.9 to the gallon, considered a good record for a sedan.

HUDSON TAKES OVER AGENCY

St. Louis, Mo., May 7—E. O. Patterson, district manager for the Hudson Motor Car Co., recently stationed at Chicago, has been elected president of the Hudson-Phillips Motor Car Co., which the factory has taken over. Mr. Patterson says that the present organization will be retained, with a few exceptions. One change is the installation of A. J. Carey of the Hudson factory as service manager. The company will retain the truck agencies. J. H. Vette, an accountant from the factory, is temporarily in charge of the offices.

THOMPSON HEADS ABBOTT CORP.

Cleveland, Ohio, May 5—Alfred Thompson has been elected president and general manager of the Abbott Corp. to succeed Guy Morgan, who resigned. Mr. Thompson has been in the motor industry since the Pope-Toledo, for which he was general manager. Afterward he was vice-president of the Geneva Automobile Co. He has managed the plant of the Rutenber Motor Co. and lately has been production manager for the Maxwell Motor Co. and Hudson Motor Car Co. in turn.

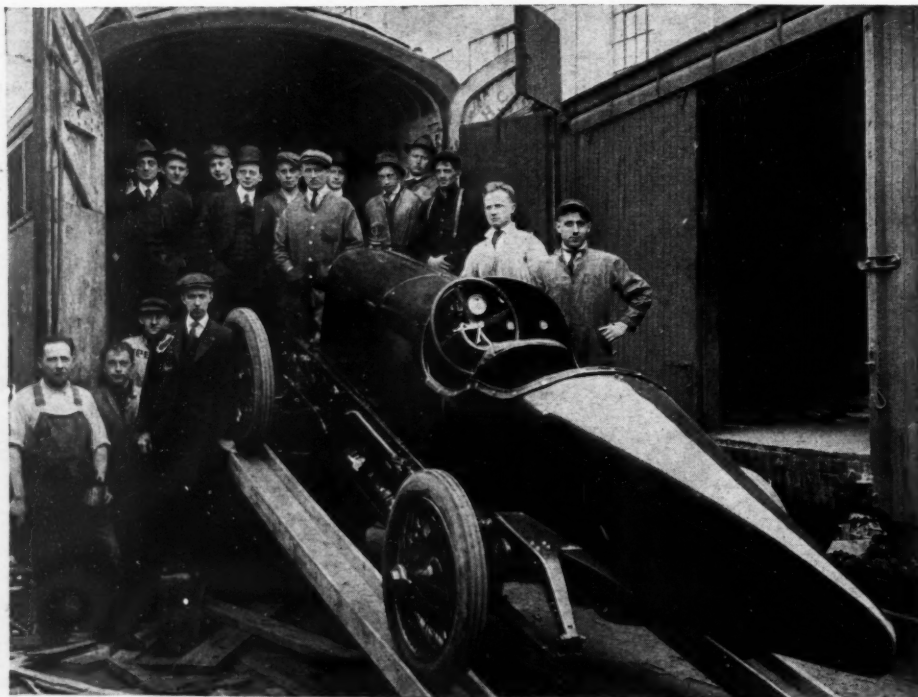
HARROUN OFFICES OPENED

Wayne, Mich., May 5—The offices of the Harroun Motors Corp. have opened and all the officers now are carrying on their activities here, with the exception of J. G. Monihan, president, and P. H. Bruske, advertising manager, who are in Detroit. The company plans to add two additional stories to the main building.

AMERICAN SLEEVE VALVE ENGINE

Philadelphia, Pa., May 4—The American Sleeve-Valve Motor Co. has obtained the patents covering a revolving sleeve as applied to internal combustion engines. The sleeve revolves between the cylinder wall and piston and is propelled by a large positive worm gear at the base of the cylinder. All moving parts, except the revolving sleeve, are of conventional type.

Delivery is expected to start by fall. The management includes men well known in the manufacturing field. E. Remington, of the arms and typewriter company bearing his name, is chairman of the board. P. E. Remington of the same company is



The new Hudson Super Six racing special. Around it are Arthur J. Hill, manager of the team, Billy Chandler, Ralph Kriplen and Jack Gable, who will replace Ralph Mulford or Ira Vail, first wheel drivers, if necessary

president, and has dropped all other interests to prosecute the work of the new concern. Wilfrid Hartley, former treasurer and factory manager of the Remington Arms Co., is vice-president.

Among the other officers and directors are also men prominent in the motor industry, including E. R. Hollender, former president of the American Fiat Sales Co.; T. M. Fenner, Wisconsin Motor Mfg. Co.; C. P. Hollister, chief engineer, formerly with the Stanley Electric Co.; H. S. Evans, vice-president, sales manager of the International Time Recording Co.; LeRoy Ferry, of Ferry & Giol, export merchants of Barcelona, Milan, Paris and Philadelphia; H. R. Davis, president of the First National Bank of Freeport, L. I., and J. E. Fite and Alexander Lawrence, Jr., manufacturers in this city.

PREST-O-LITE NAME UPHELD

Albany, N. Y., May 4—The trade mark Presto-O-Lite is legitimate and the Prest-O-Lite Co., Indianapolis, Ind., is entitled to protection in regard to its use, according to the decision handed down by Judge Crane of the Circuit Court of Appeals of the State of New York.

The suit was brought against Frederick Ray, F. Arthur Haines and Daniel R. Smith, doing business as Smith & Haines, early in 1913, charging violation of the trade mark law of New York by sale of Prest-O-Lite cylinders refilled with acetylene gas made by the Searchlight Gas Co.

Suit was brought in the Municipal court, where judgment was rendered in favor of Prest-O-Lite, this being affirmed by the Appellate tern. The Appellate division of the Supreme Court, however, reversed the decision and dismissed the complaint on the ground that Prest-O-Lite had become a generic term, indicating the article of manufacture, irrespective of its makers, and therefore not the subject of a trade mark.

RACING PROCEEDS FOR WAR

Chicago, May 8—June 16 is to be a day of monetary patriotism at Speedway park, Chicago, a major part of the proceeds from the third annual motor derby going toward the purchase of military ambulances, Red Cross work and relief corps' activities. The management of the local speedway yesterday decided to make this year's derby a patriotic affair and in addition to the 250-mile derby has arranged a program for the forenoon which should attract a record crowd in itself were not the proceeds of the race, after deducting running expenses, to be given toward swelling the war fund. The day will open with a military and motor parade to the speedway, where at 10 o'clock there will be a racing contest between amateur drivers. At 11:30 there will be a polo game and hurdle jumping contest, at 12:30 airplane war maneuvers and demonstrations, at 1:15 a military drill and band concert, and at 2 o'clock the main event of 250 miles.

Racing Season Opens at Uniontown, Pa.

Cincinnati Has Entries of Seven Drivers for May 30 Event

UNIONTOWN, PA., May 4—The Uniontown speedway will stage the inaugural motor races of the 1917 season next Thursday. Three contests are on the program. There will be a "universal trophy" for 100 laps of 1½ miles each, another 100-lap event and a 54-mile race for smaller cars.

The Ascot race March 1, which was won by Earl Cooper, was scheduled technically as the last race of the previous season, so that Uniontown claims the distinction of starting the racing season this year.

The following is a complete list of entrants, drivers and cars for the Universal Trophy meet at Uniontown, Pa., May 10. They are:

Car	Driver
Delage	Oldfield
Erbes	Burt Newman
Newman	W. E. Taylor
Johnson	Art Klein
Duesenberg	Hearne
Hudson	Vail
Hudson	Mulford
Packard	de Palma
Pugh	J. A. Meyer
Mercedes	L. Fountain
Wood	W. Longstreth
Frontenac	L. Chevrolet
Frontenac	J. Boyer
Crawford	C. M. Ewan
Crawford	H. E. McCord
Hoskins	D. Lewis
Olsen	H. McBride
Murray	H. E. Wynn
Mercer	J. Conway
Mercer	Not named
Haynes	F. McCarthy
Murray	C. W. McFarland
Peerless	I. P. Fetterman
Buick	M. Hudoc
Packard	W. Monahan
Haynes	H. L. Robinson
Oakland	J. P. Snyder
Haynes	N. P. Fetterman
Mercer	Not named

Cincinnati, Ohio, May 4—Seven entries have been received for the 250-mile event

at the Cincinnati speedway May 30. These are: Ralph de Palma, Packard twelve-cylinder; Ralph Mulford and Ira Vail, Hudson Specials; S. Ostewig, Ostewig Special; Omar Toft, Omar Special; and Jack LeCain and Jules DeVigne, DeLage. Among the entries expected are those of Barney Oldfield, Earl Cooper, Dario Resta, Louis Chevrolet, Eddie Rickenbacher, John Aitken, Jack Scales, Enrico Cagno and Joe Dawson.

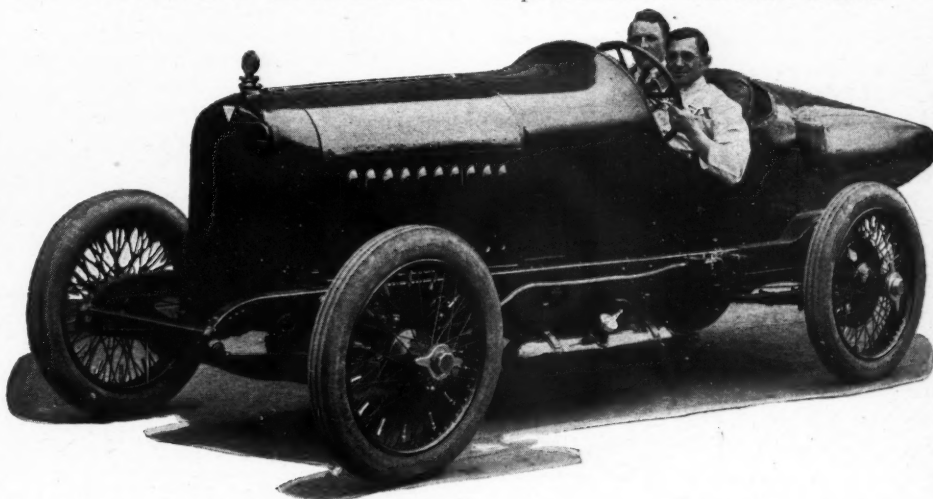
SUES HUDFORD UNIT MAKER

Philadelphia, Pa., May 5—Suit was started recently in the Common Pleas Court by Frederick W. Unger for the recovery of \$205,000 alleged to be due for his work in refinancing the Commercial Unit Co., Philadelphia, manufacturer of the Hudford Unit. It is alleged William F. Hudson, president of the company, made an agreement with Unger to secure additional capital or to find interested parties to carry to completion the orders on hand.

It is charged by Unger that after bringing the parties together he was eliminated from further transaction. The amount of the damages claimed included \$5,000 for services and a sum estimated at 5 per cent of the common stock, based on the earning capacity of the company. With the entrance of J. K. Mitchell and Normal S. Mackie, the interested parties, the Commercial Unit Co. was incorporated.

TO INSPECT INDIANA SPEEDWAY

Indianapolis, Ind., May 9—Major Benjamin D. Foulois of the aviation department of the United States army, is on his way to Indianapolis to inspect the grounds of the Indianapolis speedway to ascertain its availability for use as a training school for army aviators. Several sites will be inspected before a final choice is made.



Billy Chandler, at the wheel, and Jack Gable, in the new Hudson racer. They will be Hudson reserve drivers for Ralph Mulford and Ira Vail



The beginning of the parade to the loop district as it reached Twenty-second street and Michigan avenue

Chicago Used Car Show Opens

COLISEUM, Chicago, May 5—Bargain hunters of Middle Western motordom had their inning today. The Great Central Market Used Car Show vied with the national exhibitors which have been housed in the Coliseum each year as a lure for the dollars of the man who feels he cannot afford a new car, but who wants a real bargain and a machine that looks as much like a new one as possible. The used car show, which opened today and which will continue until May 13 might almost have passed for the national show of two or three seasons ago. Newly-varnished, polished, refurbished, overhauled, models of all the well-known makes of American motor cars bowed not to the fact that they in reality are second editions. Except to the practiced eye of the motor critic, who knows the prevailing body lines of the current season, the array of vehicles on the Coliseum floor when the show opened to-day had at least a 75-per-cent-appearance of a new car show.

Despite the lure of the Joffre celebration the floor of the Coliseum was filled almost to capacity. It was Chicago's first experiment with a used car show; in fact, the first in the United States on any such scale as this, and visitors were not the kind who visit national shows, try the upholstery, take a booklet and pass along. Visitors today pried into the inside of the car and signed checks. Like the contenders for blue ribbons at dog, cat, poultry and stock shows, each car had its bill of health tagged to it and in their new coats of polish stood boldly before critical investigators with all the

First Two Days Sales Total \$46,895—Expect to Sell 700 Cars

glory of having done their bit in service.

Just prior to the opening of the show cars of almost every make assembled at Thirtieth street and Michigan avenue ready to proceed en masse to the loop as soon as the Joffre-Viviani parade passed down Michigan avenue to the south. Flag-bedecked and headed by a band, the parade came into the loop, circled and went back south to the Coliseum. Even before the parade returned to the Coliseum and within the first half hour after the show opened, a Haynes roadster was sold to a Chicago physician. A few minutes later the Schillo Motor Sales Co., found a buyer for a duplicate of the Hupp capital-to-capital car and reported sales became frequent.

About 120 used cars of all descriptions made up the personnel of the first act of the 10-day bill, which will be changed three times daily. Figures on the official price tags when the show opened ranged from \$375 for a Maxwell to \$4,300 for an elaborately-equipped Pierce-Arrow. However, most of the cars were priced from \$500 to

\$900. Three times each day the sold cars will be removed from the floor and others rolled in to take their place.

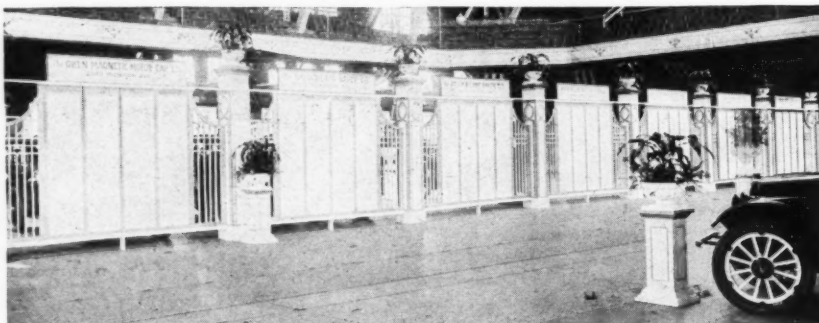
Nearly 700 cars have been appraised and certificated by a technical committee and are ready to be displayed as rapidly as there is a vacant space.

Every car entered bears three official tags on its radiator, outlining its pedigree and specifications in detail and testifying as to its having been examined and tested by the committee. Touring models are in the majority today, but there are many limousines and roadsters. Few of the offerings are more than three years old. It was noticeable today that each exhibit was made of cars which are handled as new cars by the exhibitors. As the show progresses this display will become more complex, for every dealer has used cars of several makes which will be put on sale later in the week. Thus, one may find the same make of cars in several booths as the show progresses.

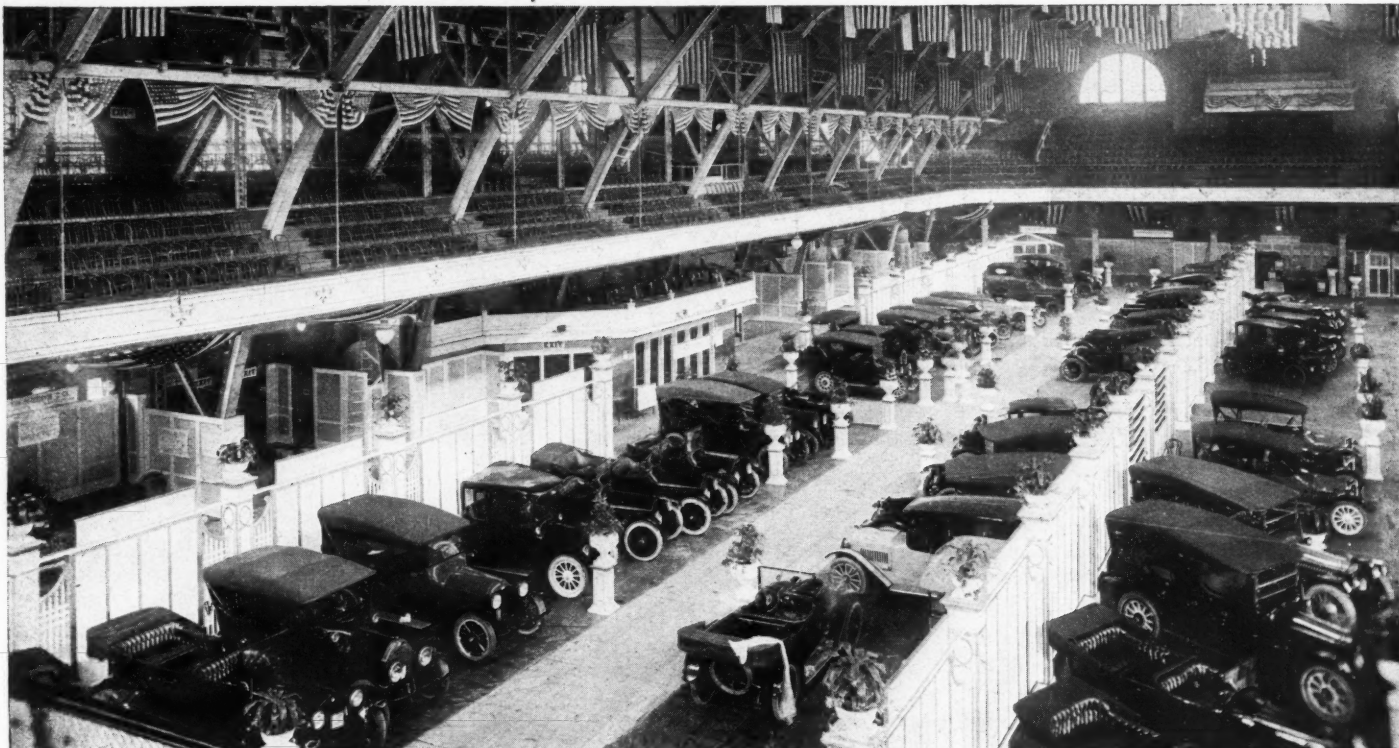
Decorations are on an elaborate scale, running to green and white and American flags. The entire ceiling of the Coliseum is hung with flags. Exhibits have a background that resembles a gate with two pillars, on top of which are potted plants. There

is a lattice for a short distance each side of the pillars and then a solid, four-panel, gate-like section. Each exhibitor has two such spaces and the divisions along the aisles are miniature sections of the pillars at the back, these, too, being topped with potted plants. The booth divisions are painted yellow and white.

To-night the show committee of the Chicago



This shows the decorative scheme of the Coliseum floor before the exhibits were put in place



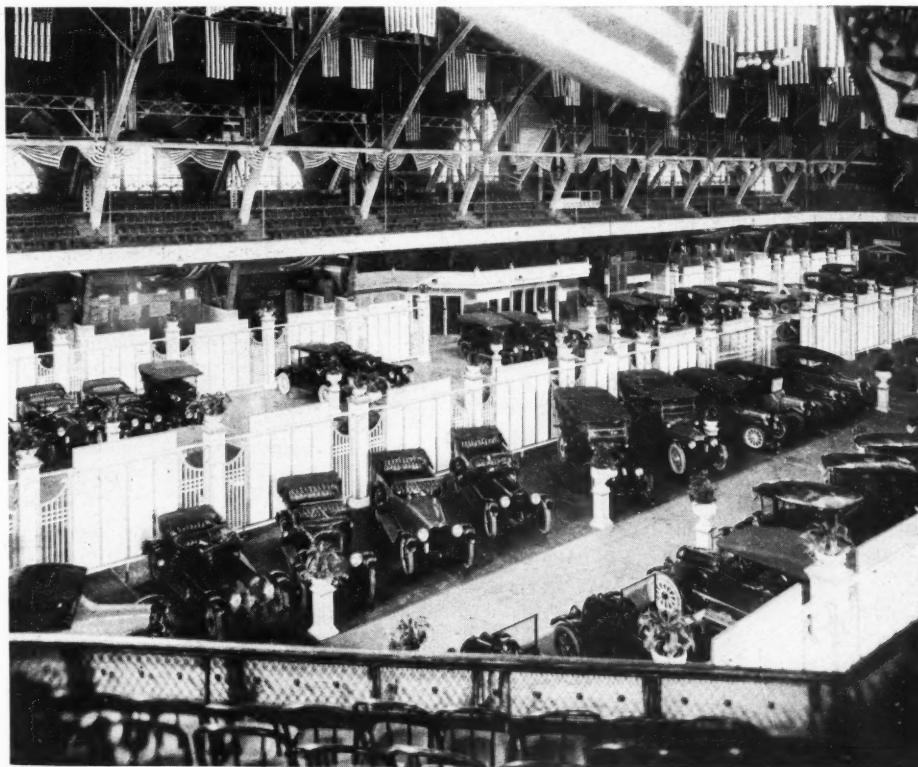
A general view of the west half of the Coliseum, showing entrance and decorative scheme as it appears from the balcony

Automobile Trade Association, under whose auspices the exhibition is being held, declared that the success of the first day far exceeded their most optimistic predictions. Until late in the evening the crowd continued to come in quest of bargains. Even the oldest salesmen and dealers on the row could not remember a time when there has been a more thoroughly buying crowd, and in this respect it appears the local used car show will outshine the national event, where there are so many who go from the desire to see the new models.

The idea of one price, marked in plain figures by the appraisal committee, seemed popular with the crowd from the start. By the time set for the evening removal hour of those cars that had been sold, more than thirty were moved out and others seemingly as attractive brought in. Cars are here to fit almost every pocketbook. The display of electrics is good and seemed to attract considerable attention from feminine visitors.

As usual, it was the night crowd that swamped the dealers. Buying continued right up to the time of closing the doors at 10:30 p. m. There was some discussion about keeping the show open Sunday, but arguments against this were overcome by those who pointed out that Sunday is the most popular day with buyers of used cars, many of whom cannot spare the time to attend week days. There were a great number of out-of-town buyers in attendance today and it is expected that this will be the case throughout the show. Farmers from down state and other nearby states are expected to be in looking for real car bargains.

Each exhibitor will distribute 600 tickets,



Oakland, Packard, Paige and Chandler exhibits in the south end of the Coliseum

members of the two motor clubs will be given two tickets each, and street car, electric sign and newspaper advertising will be used to the limit to get the public to the Coliseum during the nine-day exhibit.

There are twenty-nine accessory exhibits around the outer edge of the Coliseum. One of the most novel of these is that of the Motor Salvage Co., Chicago, which dismantles cars and sells the parts. Each day

a car will be torn down and it is expected this will interest a great many of the visitors.

Among those who are exhibitors of cars are:

Allen.....	Chicago Allen Co.
Baker Electric.....	Rauch & Lang Co.
Buick.....	Emil J. Krinsky
Chalmers.....	James Levy Motor Co.
Chandler.....	Thomas J. Hay, Inc.
Chevrolet.....	Chevrolet Motor Co.

Cole.....Cole Motor Co.
 Crow-Elkhart.....Crow-Elkhart Co.
 Detroit Electric.....Anderson Electric Car Co.
 Dodge.....Dashiell Motor Co.
 Empire.....Ralph Temple Automobile Co.
 Ford.....Erwin Greer Auto Co.
 Franklin.....Franklin Motor Co.
 Grant.....Simmons Motor Car Co.
 Hal.....Harry Newman Co.
 Haynes.....Haynes Motor Car Co.
 Hudson.....Louis Geyler Co.
 'Iupmobile.....Schillo Motor Sales Co.
 King.....King Motor Car Co.
 Klssel.....H. P. Brandstetter
 Marmon.....Marmon-Chicago Co.
 Maxwell.....Maxwell Motor Sales Corp.
 Mercer.....Schillo Motor Sales Co.
 Mitchell.....Mitchell Automobile Co.
 Moline-Knight.....Moline Automobile Co.
 Oakland.....Tennant-Oakland Co.
 Overland.....Overland Motor Co.
 Owen Magnetic.....Owen Magnetic Co.
 Packard.....Packard Motor Car Co.
 Paige.....Byrd-Sykes Co.
 Peerless.....Hughey Motor Car Co.
 Pierce-Arrow.....H. Paulman & Co.
 Reo.....Reo Motor Car Co.
 Studebaker.....L. Markle Co.
 Velle.....Illinois Motor Co.
 Winton.....Winton Co.

Several of the truck unit concerns are exhibiting, among them being: Dearborn, Maxfer, Smith Form-a-Truck and the Truckmobile. The manager of the show is Thomas P. Convey.

Chicago, May 7—Sales of cars for the first two days of the show totaled 50 machines. They brought \$46,895.

AIRPLANE FIRM FORMED

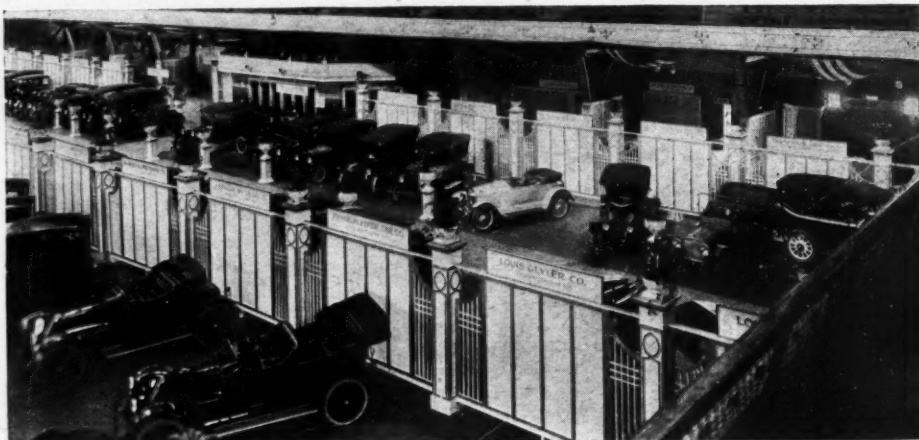
Detroit, May 5—The Kessler Motor Co., capitalized for \$500,000, will build a factory here to manufacture an airplane engine, already approved by the United States government. It is expected that the first machine will be completed within three months.

The engine is of six-cylinder construction, weighs 577 lbs., has 252 hp. and has been speeded in tests to 2400 r. p. m.

M. C. Kessler is president of the company and H. C. Brooks, Jr., is treasurer.

SILVER DISCONTINUES CHALMERS

New York, May 5—The C. T. Silver Motor Co. has discontinued handling the Chalmers car in metropolitan territory. A Chalmers branch has been established in New



Winton, Crow-Elkhart, Allen and Dodge booths in the north end of the Coliseum

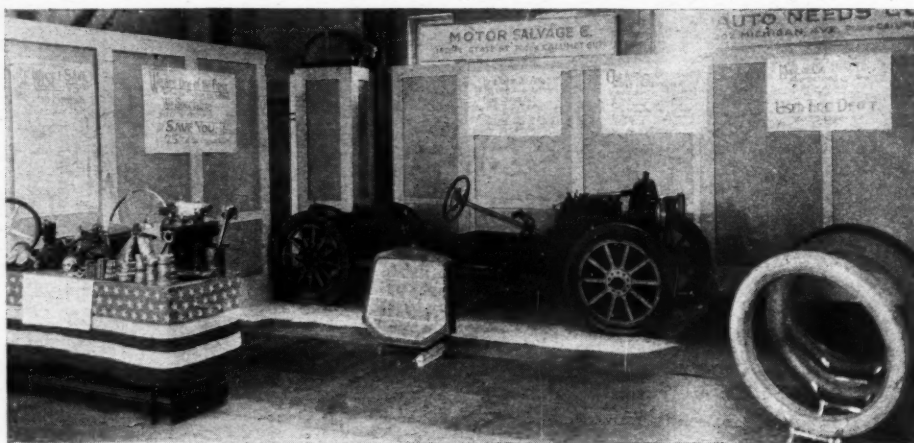


Exhibit of the Motor Salvage Co., Chicago, where a car is dismantled each day

York and will handle both wholesale and retail sales in the metropolitan territory and environs.

The Silver company, which is one of the largest distributors in the metropolitan trade, first came into prominence in the spring of 1910, when it acquired distribution of Overland cars.

For the present the Silver company will concentrate its efforts on the distribution of the Dort.

Chalmers sales will be handled by a new company, which is to be styled Chalmers Sales Co., though it will be a direct factory branch. C. H. King, who has been head of

the department of dealers for the Chalmers company since March of this year, will be in charge.

DEALERS URGE WAR SUPPORT

Chicago, May 8—Chicago motor car dealers are urging everyone to respond with aid to the government at this time and especially to support the Red Cross with such contributions as they best can afford. Harry Newman, president of the Harry Newman Co., HAL distributor, has carried a full page advertisement in the daily papers asking contributions to the Red Cross, and the Newman ad has been republished by G. W. Stratton, King distributor in Chicago territory.

G. M. PLANS TRACTORS

Detroit, May 5—The General Motors Co. is preparing to make tractors on a large scale. W. C. Durant, president of the company, visited Pontiac this week for the purpose of viewing the operation of a tractor in the \$1,500 class which will be made by the General Motors Truck Co. The General Motors company has purchased several tractor rights within the last few months and plans to manufacture in the different plants of its organization. Mr. Durant states that he will develop the tractor business as rapidly as the demand necessitates.



Electric row on the east side of the Coliseum and some of the gasoline car exhibits

Drive an Army Truck!

U. S. Needs Men for Forty Trains for Military Work

Five Companies Have Been Enrolled in Reserve Corps

NEW YORK, May 4—Wanted: Crews to man forty motor truck trains for army work. That is the content of orders issued from Washington and transferred through Major Frank H. Lawton.

The Motor Truck Club will do a large share of this work. Men will be recruited into the Quartermaster Enlisted Reserve Corps and will enlist for four years with but fifteen days' compulsory service, if so ordered.

Thirty-four drivers are needed for each truck train. This means 1360 will have to be obtained to man all the truck trains.

Committees in Boston and this city will carry on this work. Other committees will work in Atlanta, Ga., and Philadelphia. A similar committee has been formed in Boston to cover the New England states.

The drivers will be enlisted as sergeants. The enlistment station at Governors Island is to be moved to the United States Rubber Co.'s building at 1790 Broadway, New York, where application blanks can be obtained. Other stations will be opened at Philadelphia, Washington, Buffalo, Rochester, Syracuse and various cities throughout the Department of the East.

Applicants must be between the ages of eighteen and forty-five. They will be examined by a special examining board. They will be required to keep themselves physically fit for military service for four years and to attend each year, if so ordered, an army encampment for two weeks only, for which duty they will be paid. Men who enlist in this reserve retain their status as civilians, and are only required to leave their homes to attend an encampment in time of war or threatened war.

Truck drivers in the Enlisted Reserve Corps will receive \$36 a month and will have their railroad fares and general expenses paid. Uniforms will be supplied as for enlisted men of the Quartermaster Corps of the regular army reserve, except the insignia.

One company of thirty-four drivers represents a result of the work done in New York last week by the Motor Truck Club of America. In addition four other companies are virtually complete. One has been enrolled at Columbia university and another at Princeton.

CHANGES IN STOCK EQUIPMENT

New York, May 7—A number of important changes in the equipment of motor cars was made during April. The Hudson company has added a four-passenger Phaeton at \$1,750. The Stephens is now equipped

with Delco ignition, Stromberg carbureter and Delco starter. The Kissel-Kar company has changed the size of its tires on its 100-lb. model six to 34 by 4 from 33 by 4. The 6-42 and the twelve have 34 by 4½ instead of 34 by 4.

The Metz company is now equipping its cars with Atwater Kent ignition and Westinghouse starting and lighting. The King company is now using the Bijur starter and lighting. Paige is equipping its model 6-51 with the Remy starter and the 6-39 with the Stromberg carbureter. Regal has changed to Heinze-Springfield ignition and starter on its model 4-32. Empire is using Connecticut ignition on its model 45 and has also changed to dry-plate clutch instead of cone. The Empire company has dropped the old model numbers and has substituted the numbers 50, 51 and 70A. Model 51 is precisely the same as Model 50, except that it has wire wheels and sells at \$1,165, compared with \$1,125 for Model 50.

The Chalmers wheelbase is now 117 instead of 115 in. Apperson has changed the bore of the eight to 3¼ by 5 from 3½ by 5, increasing its S. A. E. hp. from 23.4 to 33.2. Pullman now uses Atwater Kent ignition and Dyneto starting and lighting.

The new 6-60 Abbott will have a 7N six-cylinder Continental engine, 3½ by 5¼, Remy ignition, starting and lighting, Stromberg carbureter, dry-plate clutch, three-speed gearset, 122 in. wheelbase, 34 by 4 straight side tires. It will be made as a seven-passenger open car at \$1,595, coupe at \$2,100 and a Sedan \$2,150.

The bore of the Chandler has been increased from 3⅝ to 3½, the stroke remaining at 5 in.

CORRECTION

Detroit, May 4—The new price of the car made by the Ross Automobile Co. is \$1,750 and not \$1,775, as announced in MOTOR AGE of April 27. The increase was made from \$1,550.

REDDEN ASKS INJUNCTION

Chicago, May 5—Another development in the patent controversy among truck-forming makers has been made through the petition of the Redden Motor Truck Co. and Albert E. Cook, owner of the Cook truck-forming patents, in the United States District Court here for an injunction ordering the Smith Motor Truck Corp. to discontinue manufacturing Form-a-trucks. Infringement of the petitioner's patent rights is alleged.

This petition is another step in the suit brought last August in the United States District Court in Chicago by Cook and the Redden company, in which infringement of the Cook patents is claimed. The suit is still pending. The Smith company filed suit in October in the circuit court of Cook county to restrain Cook and Charles W. Hills, attorney for Cook and the Redden Motor Truck Co., from representing that they have a valid contract under which the Smith company has agreed to pay royalties for operating under these patents.

War Boards for Civilians

Citizens of Country to Mobilize Their Services to Aid U. S.

Official Approval From Capital Is Understood

CHICAGO, May 8—Approval is understood to have been given by the War Department for the organization of a national service reserve made up of men not eligible to be drafted into the army and of women, these to be available for any service they can perform for the government, such as aid in recruiting, work under those having government contracts, or on farms to increase the supply of food for the army and navy.

As an indication of the feasibility of such a plan, Chicago yesterday organized a citizens' war board with more than 300 representative men and women as its incorporators. Until the war is over this organization will act as the clearing house of men, materials, wealth and relief, co-operating with the state and national councils of defense. It will take up the self-imposed duty of mobilizing every resource and energy of the Chicago district and coordinating all war activities.

Some of the big steps that may be undertaken are:

A Registration of Chicago's man power that all may be of some service.

B Cataloging and mobilizing of Chicago's industrial resources for intelligent service to an army in the training camp or in the field.

C Mobilization of the city's finances so that its money power may be laid upon the altar of service to the country.

D Marshaling of Chicago's overflowing patriotism into an effective force capable of spreading its influence and enthusiasm where the greatness of the nation's opportunities in this crisis have not been realized.

Other cities are expected to fall in line and organize so that every American can be of service to his or her country, especially those not eligible to go to the firing line.

WHITE MOTOR CO. ELECTS

Cleveland, Ohio, May 5—The White Motor Co. held an election today, and the following officers were elected: President, W. T. White; first vice-president, W. C. White; second vice-president, E. W. Hulet; secretary, A. R. Warner; treasurer, Otto Miller; chairman of the board, M. B. Johnson. The officers and J. R. Nutt, J. H. Harding, Theodore Roosevelt, Jr., E. R. Tinker and A. M. Hall, II, comprise the newly elected board of directors.

Standardize Motors for War

Men of Aeronautic, Tractor, Truck and Marine Industries
Adopt Standards of Parts and Material for Quick Production

CLEVELAND, Ohio, May 5—Mechanisms rather than men will be the deciding factor of the present war. Victory will come through the effectiveness and numbers of machines, not only within the zone of hostilities but throughout the entire territory by which the zone of military operations is supplied.

Important and indispensable as are the heavy artillery pieces, the machine guns, the airplanes and the motor vehicles operating on or near the firing lines, they can be effective only insofar as other machines in centers far removed from the area of activities can supply them with ammunition and their operators with food. It is in the rapid, efficient and accurate production of all these machines that the decision of the war rests.

Production of these machines, be they guns, airplanes, trucks or tractors, rapidly and accurately means interchangeability of parts and standardization of sizes, shapes and materials. To arrange for such standardization where it applies to any machine in which the internal combustion engine is used for propulsion has been the chief work of the Society of Automotive Engineers. Its most important branch has been the Standards committee in which this work is carried forward.

Previous to last summer, the work of the organization was confined principally to the motor vehicle, as indicated by its old name, Society of Automobile Engineers. Recently, the scope of the society's efforts has been broadened to include aviation,

By Darwin S. Hatch

marine engines and tractors, and the broader name of Automotive was applied to the organization.

Special value therefore attaches to the meeting of the Standards committee yesterday and the day before in Cleveland, as it is the first gathering of the engineers since the organization formally adopted its new name, with its broader responsibilities. As was to be expected, nearly all the work accomplished had distinctly a military bearing and many of the standards adopted by the committee for presentation to the society as a whole for final action were either dictated or influenced by war.

The Standards committee, whose personnel includes the engineers most closely in touch with modern design and construction in each of the different branches of these industries, is divided into divisions which do all the preliminary work of settling upon standards of practice. The reports of these divisions then are discussed and passed upon by the committee as a whole and are either referred back to the division for further work or are adopted for submission to the entire membership of the society.

Upon adoption by the society, the standards become the recommended practice of the industry. The two- or three-day meeting of the Standards committee, then, often represents months of work by divisions.

Perhaps in no better way can the broadened scope of the Standards committee work and its supremely important military

bearing be brought out than by a short synopsis of the aviation standards adopted yesterday. These were incorporated in the report of the Aeronautic division under the chairmanship of Charles M. Manley of the Curtiss company and presented by Fred Duesenberg, maker of the Duesenberg racer and now building engines for airplanes and submarine destroyers. Among the recommendations of the division which were adopted subject to the approval of the War and Navy departments, were:

Airplane Standards Adopted

1—Adoption of two types of control, the Deperdussin and the stick type.

2—Marking of fuel and oil pipe lines, fuel lines with red stripes $\frac{1}{2}$ -in. wide painted around the pipes and 24 in. apart; and oil lines with circular white rings $\frac{1}{2}$ -in. wide and 24 in. apart.

3—Use of the English system of measurement in airplane matters except in such isolated cases as spark plug threads where the metric system is desirable. This action is due to the fact that the Army and Navy departments are not both in favor of adopting the metric system.

4—The following spark plug dimensions: Thread, 18 mm., $1\frac{1}{2}$ mm. pitch. The hexagon is to be 1 in. across flats.

5—Engine rotation to be defined as: "The direction of engine rotation is normal when the final power delivery member of the engine rotates anti-clockwise, viewed facing the power delivery end. Opposite rotation is anti-normal."

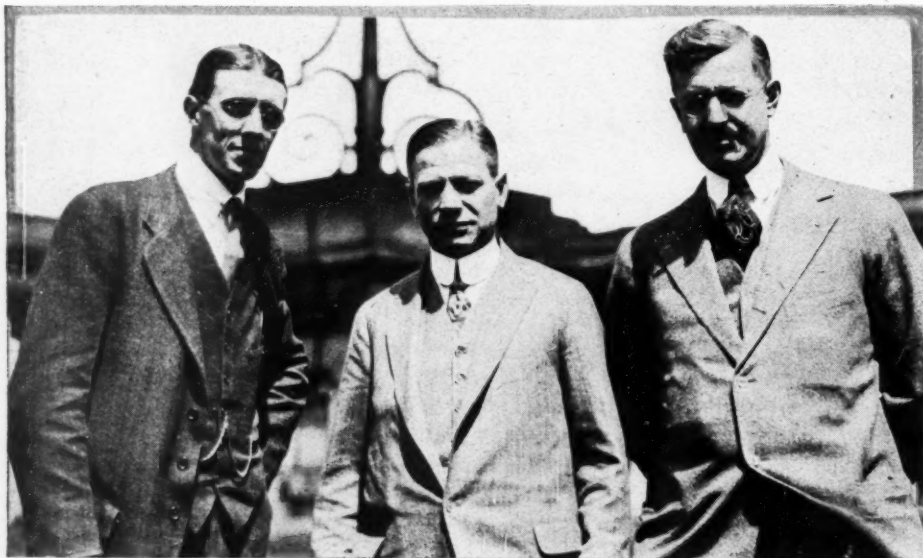
6—Approval of the following S. A. E. standards for aeronautic practice: Steel specifications, heat treatments, test specimens, ball bearing sizes, throttle levers, magneto dimensions, cotter pin sizes, and screws and bolts.

7—Many other standards relating exclusively to aeroplane practice were approved, including flexible cable ends, spliced, non-flexible ends, thimbles, turn-buckles, pipe fittings, propeller hubs, etc.

The S. A. E. in reality took over the work of airplane standards last year by amalgamating with the aeronautic engineers and since that time has applied to airplane practice a host of previous S. A. E. standards that apply equally well to aviation engines.

Previous standards for many features of motor cars and trucks proved to be equally good practice for marine engines. Thus the development of standards for the rapid production of marine engines for scout boats, submarine chasers and similar vessels wanted so quickly and in such large numbers was facilitated greatly. The recommendations of the Marine division, a new and most important one at this time, were accepted by the committee as a whole. Some of the standards adopted are:

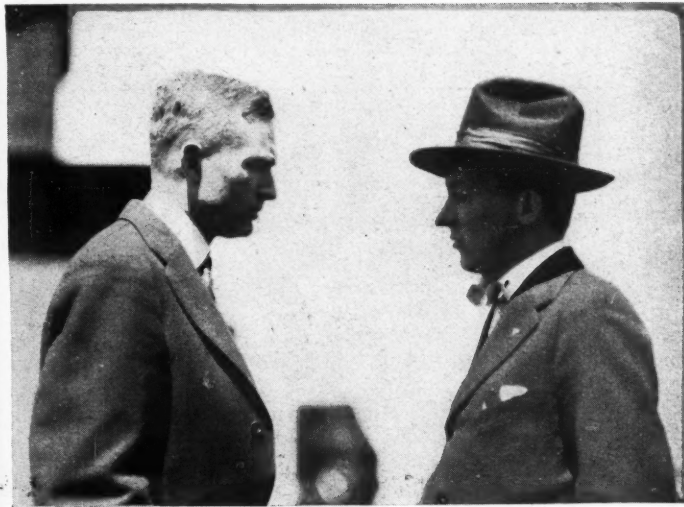
Yoke and eye rod ends and pins; cotter pins; spark plug shells; screw standards up to $1\frac{1}{2}$ in.; screw thread tolerances; tap drills; large diameter screw thread; lock washers; square broached fittings; six-spline fittings; ten-spline fittings; four-spline fittings; carbon steels; screw stock; steel castings; nickel steels; nickel chromium steels; chromium steels; chromium vanadium steels; silico-manganese steels; heat treatments; bearing metals; phosphor bronze; brass casting metals; manganese bronze sheets and rods; hard cast bronze; gear bronze; aluminum alloys; brass sheets and strips; brass rods; tobin bronze rods; non-



Present chairman and two past chairmen of the Standards Committee, S. A. E. At right, Chairman J. G. Utz, consulting engineer, Standard Motor Parts Co.; middle, K. W. Zimmerschied, chief metallurgist, General Motors Co.; left, A. Ludlow Clayden, engineering editor, *The Automobile*



Ex-Chairman Zimmerschied talks starting and lighting to Joseph Bijur, president, Bijur Motor Lighting Co., right



C. W. McKinley, chief engineer, Willys-Overland Co., right, and W. A. Frederick, chief engineer, Continental Motors Co.

ferrous metal tubing; round tension test-specimen; flat tension test-specimen (standard); flat tension test-specimen (alternate); shock test-specimen; gray iron test-specimen; Brinell hardness test; cold drawn seamless steel tubes; bands and strips; roller bearings; carburetor flanges $\frac{1}{2}$ to 2 in.; carburetor flanges $2\frac{1}{2}$ to $3\frac{1}{2}$; flared tube unions; gasoline pipe sizes; flared tubes, ells and tees; throttle levers; throttle lever throw; carburetor air heater; magneto dimensions; pump base dimensions; electric bulb bases, sockets and plug ends; location of engine number; oversize cylinders; piston-ring grooves; storage battery directions; electrical insulation requirements; flexible steel tubing.

Army Truck Specifications

Perhaps the one division which has accomplished the most important work for America in its prosecution of the war, because it is the one which up to this time has had the greatest opportunity, is the Truck Standards division. *MOTOR AGE* readers have been told of the standard specifications for the $1\frac{1}{2}$ - and 3-ton military trucks, which were prepared by the S. A. E. and adopted by the Quartermaster General of the Army and based upon which thousands of trucks will soon be ordered. These specifications were the work of the Truck Standards division, assisted by Chairman Utz of the Standards committee and others in the society. Other divisions which assisted in the work by recommending standards in their particular fields were the Springs division, the Electrical Equipment division and the Tire and Rim division.

The Standard committee's office yesterday was simply to ratify the action of these divisions in the preparation of the specifications for military trucks. One of the things that was emphasized was the fact that these specifications are purely for military purposes. They are not intended for commercial work. In fact, it was pointed out that some of the requirements would be more stringent than necessary for commercial trucks.

It was this consideration that led the Standards committee to decide to suggest to the Quartermaster General that instead of calling the trucks $1\frac{1}{2}$ tons and 3 tons, they be classified under other names that did not state the capacity definitely. This

was at the suggestion of C. W. McKinley, chief engineer Willys-Overland Co.

Most important from a military standpoint was the report of K. W. Zimmerschied, past chairman of the Standards committee and metallurgist for General Motors Corp. on the work of the Tire and Rim division. He announced the standardization of demountable solid tire and rim equipment for military trucks and the fact that these later probably will be adopted for commercial vehicles.

To show how important this is it may be pointed out that when the first lots of trucks went to the Mexican border, it was impossible in most cases to use on any other make the tires for one make of truck. With the Standard specifications it will be possible to use any make of tire on any wheels. The division suggested special designs which make the wedge rings and side flanges much more simple than those proposed by the Quartermaster's department. A single type of wedge ring will serve for all single and dual tires, no matter what width. Similarly, the center and side rings are reduced to a single type, the latter of which can be used for single or dual tires.

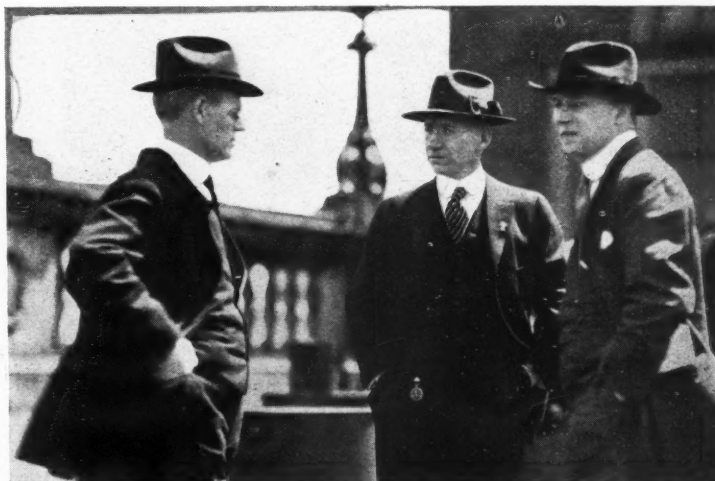
One of the features in which the work

of the Society of Automotive Engineers is of greatest importance to the nation as a whole is in its standardization of tractors, both for agricultural purposes and for direct military service. It is particularly in the farm tractors that its national importance is felt at this time. The need of greatly increased production by the farms so that America may not only feed itself but its allies has made the farm tractor an implement of prime importance to the nation.

Helping Feed the World

Consequently, it was expected that the recommendations of the Tractor division of the Standards committee at this meeting would be of greatest interest. Developments of more immediate importance, however, made it necessary for this report to be withheld temporarily. Just what these developments were it is not permitted to state, but their trend may be gained from the fact that it is a result of a cable message sent a few days ago by the society to the Institution of Automobile Engineers in England and to the Automobile Club of France, offering assistance by way of tractor information in connection with the food conservation problem. A reply had been received

W. M. Newkirk, general manager, William and Henry Rowland, Inc., left, and C. F. W. Rys, metallurgical engineer of Carnegie Steel Co., right, talk of materials



have all windows and doors closed during runs.

8—A car fitted with an open body must have the top up and windshield fully erected during the runs. Rear curtain must be fastened down. Side curtains must not be used.

10—The same gear ratio between the engine and ground shall be used throughout the entire series of runs.

11—At no time during the runs shall coasting, declutching or the use of brakes be permitted.

12—Oils and greases used in the engine, transmission, rear axle or other parts of the car must be of usual quantity and quality.

13—The whole of the fuel used during the test must be of one quality. A sample of the fuel shall be taken for the purpose of determining and recording its specific gravity.

16—The entire cooling system must be fully operative during the test, both as regards air and water circulation.

17—From the beginning to the conclusion of the entire test (including both the acceleration and economy runs) there shall be no manipulation of any carburetor adjustments or control other than the throttle.

Fuel Economy Runs

20—The length of each run must be such that at least 2 lbs. of fuel are consumed.

21—The fuel consumption shall be measured at a series of speeds covering the entire range of the car from the minimum to the maximum, following in general the outline in the table.

	M.P.H.
1st run.....	Minimum speed
2d run.....	9-11
3d run.....	14-16
4th run.....	19-22
5th run.....	26-30
6th run.....	35-40
7th run.....	47-55
8th run.....	63-70
9th run.....	Maximum speed

NOTE.—In case the maximum speed is less than that indicated in any of the other "runs" the latter shall be omitted from the test. In any event, however, a run is to be made at the maximum speed of the car.

22—Fuel shall be fed to the carburetor during the runs by gravity and shall be supplied from a weighing tank mounted so that the actual distance between the top of the float chamber of the carburetor and the bottom of the fuel chamber is not less than 12 in. The tank shall be such that the variation in head during a run shall not exceed 12 in.

Acceleration Runs

28—There shall be five series of acceleration runs and each shall consist of four, made consecutively on the same course, reversing the direction each time, starting at a constant speed, which shall be maintained for a period of at least 10 sec. after which acceleration shall begin and continue for 50 sec.

The speeds minimum for each series are as follows: First, minimum speed obtained in economy runs; second, 9 to 11 m. p. h.; third, 14 to 16 m. p. h.; fourth, 19 to 22 m. p. h.; fifth, 26 to 30 m. p. h.

32—Previous to any of the acceleration

runs the exact distance traveled by the right front wheel in ten complete revolutions on the course shall be determined by measurement with a standard steel tape.

Method of Calculation

33—The entire calculations are based upon the assumption that the increment of velocity of the car is constant during any second.

Reference to the following will assist in explaining how the results are arrived at:

N_1 = number of holes (fifths of revolution of right front wheel) in any second.

N_2 = the number of holes (fifths of revolutions of right front wheel) in the previous second.

V_1 = velocity in feet per second during any second.

V_2 = velocity in feet per second during the previous second.

V_m = velocity in m. p. h. for the same second as is referred to by V_1 .

C = constant—feet represented by $\frac{1}{5}$ revolution of right front wheel.

A = acceleration in feet per second in any second.

T = time in seconds.

Then $V_1 = N_1 \times C$

$V_m = V_1 \times 0.682$

$A = V_1 - V_2 = (N_1 - N_2) C$

T

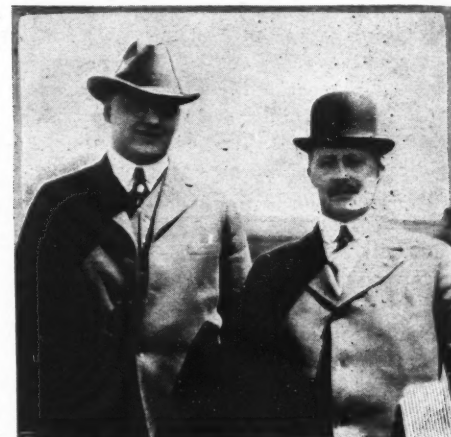
34—There shall be one curve plotted, showing the results for each series of acceleration runs and shall show the relation between velocity in m. p. h. and time in seconds.

DATA SHEET FOR CAR PERFORMANCE TEST

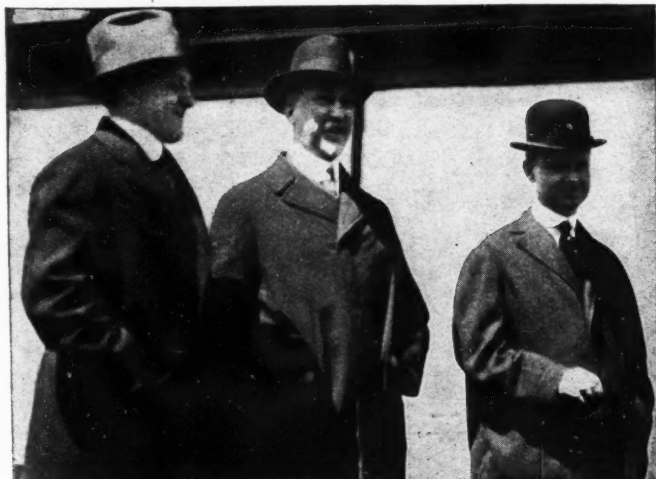
No. Date of Test.

GENERAL DATA

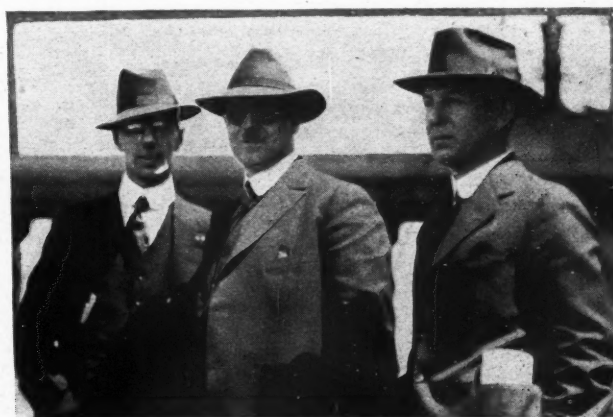
(a) Car—(Name, year, model) Stock—Yes No
 (b) Manufacturer (Name and location)
 (c) Location of course
 (d) Weight of car alone
 (e) Number of passengers in full complement
 (f) Weight of full complement of passengers
 (g) Total weight (includes d and f) On front axle On rear axle
 (h) Tires (make and trade name) Stock Equip.—Yes No
 Size—Front Rear
 (i) Pressure in tires (lb. per sq. in.)—Right Front Left Front Right Rear
 Left Rear
 (j) Carburetor (make and model) Size Stock Equip.—Yes No
 (k) System of fuel feed for carburetor
 (l) Ignition system (make and model) Stock Equip.—Yes No
 (m) Gear ratio on highest gear Stock Equip.—Yes No
 (n) Size of engine bore in. Stroke in. Number of cylinders
 Total piston displacement (cu. in.)
 (o) Horsepower rating (N. A. C. C.)
 (p) Fuel
 (q) Lubricating oil (trade name and grade)
 (r) Weather Temperature
 (s) Barometer in. Hg. Relative humidity per cent.
 (t) Wind velocity Direction



A. C. Bergmann, New York manager, Perfection Spring Service Co., left, and W. P. Kennedy, consulting engineer, right



Two of the research division. Right, Professor D. L. Gallup of Worcester Polytechnic Institute and Professor R. M. Anderson of Stevens Institute of Technology in center



H. J. Garceau, sales engineer, Warner Gear Co., left; P. J. F. Batenburg, chief engineer, F.W.D Co., center, and A. F. Milbrath, engineer, Wisconsin Motor Mfg. Co., right.

Boys to Aid Motorists

Los Angeles Teaches Its Scouts Principles of First Aid to Cars

Lectures and Practical Work in Course of Instruction

IN LOS ANGELES, Cal., a movement is being started whereby the Boy Scouts of America will be given an efficient course in first aid to motorists, this to include the things that must be done to start the car that is stalled at the roadside, provided the car is not seriously damaged in its operating parts. This movement was started by Andrew Baldwin of Los Angeles, and it is intended by the co-operation of the Scout Masters throughout the country with Mr. Baldwin that every scout in the land may be given expert training in the principals of how to keep the car running. The aim of the originator of this system is to make it possible for the boy scout to offer intelligent aid any time he may notice a motorist having trouble getting his car to move.

Learning how to patch a punctured tube, changing of tires and being able to differentiate from a two-cycle and a four-cycle engine will be included in the course. The instructions will consist of first-hand knowledge generally necessary to start the car "laid up" by some minor trouble. Small adjustments on engines and the eradication of carburetor troubles also will be taken up, while the scout will be made familiar with the various electric systems, gears, etc.

Two distinct classes or series of lessons will be given, each consisting of three lessons. The first series, which will be conducted along elementary lines, will be primarily for the members of the boy scouts' organization. After this course has been completed the advanced course will be en-

tered on, and in addition to the scouts this latter course will be open to the "older brothers." To the scouts successfully passing the examinations efficiency credits will be awarded by the scout master, while to the scout who passes with an exceptionally high mark a badge of honor will be presented. Each scout company will have printed instruction sheets from the headquarters in Los Angeles, and from these the scout masters will be expected to work. In addition to the lessons the intention is to have expert motor car men in the various cities give lectures to the scouts in their particular section.

RHODE ISLAND OPENS GATE

Providence, R. I., May 5—Rhode Island has let down the bars to visiting motorists. This was its most important legislation passed this year. Visitors were allowed only ten days in any one year, the same as New Hampshire, and Rhode Islanders found that when they went elsewhere their privileges were being curtailed.

DOBLE COMPANY ORGANIZED

Detroit, May 8—Special telegram—The Doble Detroit Steam Motors Co. has been organized to manufacture Doble Detroit steam cars with a capitalization of \$10,000,000. This company will be the only company with the right to use the name Doble in the corporate title or in its products, although other concerns may be licensed under Doble patents to use the Doble powerplant. The names of the officers are not yet disclosed, but it is understood they will be prominent individuals. More than 1100 dealers and sub-dealers already have organized and contracted for \$12,000,000 worth of cars. This does not mean the absorption of the General Engineering Co. This is a separate unit and will continue in business as an engineering concern which proceeds with products only to the point of perfecting them for further production and marketing.

Tests Military Transit

Car Makes Record Run in Trip from Summit of Mount Wilson

First Continuous Trip Made to Pacific Ocean Isle

LOS ANGELES, May 3—Santa Catalina channel, off the south coast of California, is a favorite rendezvous for the Pacific squadron. On the assumption that army officers, who have been using the instruments at the observatory on Mount Wilson, 6000 ft. above sea level, demand communication with officers of the fleet at a time when radio communication is impossible and weather conditions prevent the use of the heliograph or other signaling devices, the demonstration of the efficiency of motor transportation, other than aircraft, made here recently, is of importance.

It is 77.9 miles from the summit of Mount Wilson to Avalon, the harbor on Santa Catalina Island, by the shortest route. Through motor car and motor boat this distance was covered in 2 hrs. 55 min. in the first continuous trip ever made between the two points. A Franklin touring car, driven by Ralph Hamlin, the Franklin dealer here, with Roy Compton serving as messenger, made the run down the mountain trail, 9 miles, in 30 min. A dense fog made the last 2 miles dangerous.

Despite the fog, which was so thick as to be impenetrable 100 ft. in advance of the car, the 39.9 miles from the foot of the trail to Fellows landing at Wilmington were covered in 1 hr. 55 min. At this point the passengers transferred from the motor car to the Fellows 3, the fastest motor boat on the coast, and with Joe Fellows, owner and builder, at the helm, the last lap of the dash to the island began. The 5 miles from Fellows landing to the San Pedro breakwater were made in 15 min., and the 24 miles from the breakwater to Avalon in an hour, the quickest time this distance ever has been made. The only time lost on the trip was 5 min. in making the switch from car to boat and getting under way again.

TO PILOT MOTOR CARAVAN

St. Louis, Mo., May 7—Arrangements have been completed here for the reception of the motor car delegation from San Francisco Advertising Club, which will leave that city May 20 to attend the annual convention of the Associated Advertising Clubs of the World in this city, beginning June 3. The delegation will be piloted across the western half of the continent by Buick dealers. F. W. A. Vesper, president of the Vesper-Buick Auto Co. of this city, will go to Denver to meet the tourists in that city on May 27. The Kansas City agency will send a pilot from there and will supply one to Jefferson City, Mo., where a St. Louis pilot will pick them



A snapshot of the run made from Mount Wilson to Santa Catalina to test time possible in military duty

up. The tourists will reach this city June 3 and will be met at St. Charles by R. E. Lee, chairman of the general reception committee and secretary of the Automobile Manufacturers' and Dealers' Association, and a delegation of local motor car owners.

The route planned for the trip is 2600 miles, and the tourists expect to make it in ten days. There will be twenty cars and two drivers for each car. The plans are that no two cars shall be of the same make. Reno and Truckee motorists have pledged to have the Emigrant pass cleared and this will be the earliest trip through this pass for a motor delegation. All along the route preparations have been made for evening receptions. The long cross country tour has aroused much interest among tourist associations, and it is planned that an army officer will accompany the delegation as an observer.

STEWART-WARNER STRIKERS BACK

Chicago, May 8.—Amicable settlement of difficulties arising a week ago between employees and the Stewart-Warner Speedometer Corp. was reached last night, and the plant opened again this morning. It is understood that the men are returning with the right granted them to organize and to take their grievances to a committee, and that there is a further understanding that the men will not be replaced by "women at half pay because of war scares." The strike hinged on the placing of a woman in the position formerly occupied by a man who enlisted and at a lower salary than that which the man drew. Her discharge was demanded by other employees, and the plant was closed all last week while adjustment was being made.

TO IMPROVE NEW HIGHWAY

Spokane, Wash., May 7—At the annual meeting of the National Parks Highway Association about fifty representatives from along the route from Chicago to Puget Sound were present. Special attention was given to the necessity of improving this highway with a view to its utility as a military highway for transporting troops and munitions by motor cars in case of need.

On account of the Pacific Northwest Tourist Association, which takes in Washington, Oregon and British Columbia, it was decided to continue the National Parks highway to Crater Lake National Park in Oregon and to mark the entire routes from Chicago to Crater Lake with concrete posts 5 ft. high, bearing the letters N. P. H.

Secretary Guilbert reported that new maps of the National Parks highway are now being printed at a cost of \$2,000 and recommended the printing and distribution of 50,000 topographical maps showing the principal tributary roads to the National Parks highway. Every representative present signified his intention to stay by the three-year plan of contribution to the association adopted a year ago. The budget for the present year calls for an expenditure of \$4,700.

7000 Fords in Argentine

Car Costs \$1,700 in Country's Coin—Was \$2,000 Before Local Assembly

Most of Sales Are Made in Camp Areas

New York, May 4—A. H. Lloyd Davies, assistant to E. H. Hampton, manager of the Ford branch at Buenos Aires, Argentine, and who has been visiting in the United States for some weeks returned to Buenos Aires a few days ago. Mr. Davies states that there are at present 7000 Ford cars in Argentine and that his branch started assembling last October. The assembly branch has capacity for forty cars per day, but this number is rarely reached, due to scarcity of materials. At present 230 men are employed in the Ford activities in Buenos Aires, these being connected with the assembly work, retail and wholesale, service, etc. The Ford business occupies five different activities, being represented by assembly, retail sales, wholesale sales, service and warehouse. In all, five buildings are occupied, two being used for the assembly system.

One year ago Ford cars were selling for \$2,000, Argentine pesos, but since assembly has been started the price has been reduced to \$1,700, Argentine pesos. Mr. Davies reports that it is possible to secure good labor for assembly purposes. His concern takes unskilled help and trains it, which is accomplished in a relatively short time. Although agricultural conditions have been very poor in many parts of Argentine during the last summer, which ended a few months ago, the Ford company is 700 orders behind at present. In addition to selling touring cars it is disposing of many chassis which are fitted with delivery wagons. At present 85 per cent of the sales are going into the country, or camp, areas.

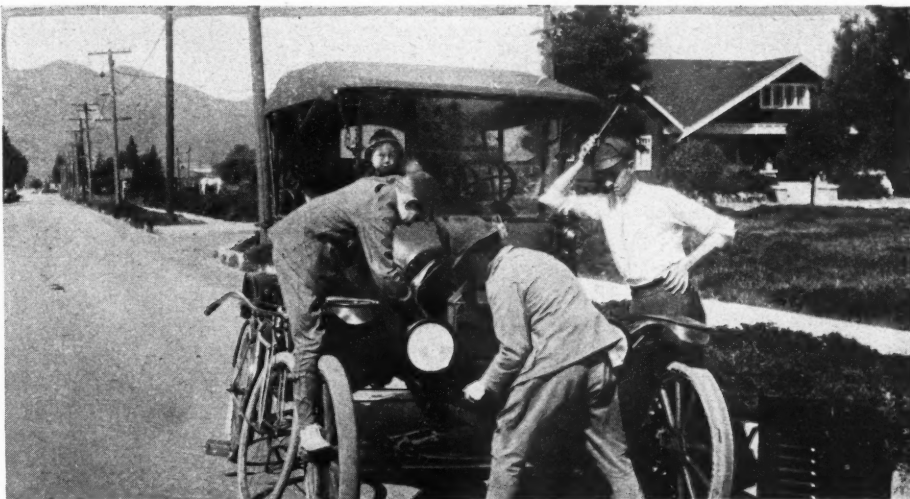
There are at present seventy Ford dealers in Argentine and as many sub-dealers. Each year finds the territory of the dealers and sub-dealers reduced in area, notwithstanding which the sales for each is increasing. The Ford company is pushing its system of country-wide salesmanship the same as in this country. While the Buenos Aires factory is serving only Argentine the Ford company is working the South American territories very carefully. It has at present three special men traveling practically all through Brazil organizing the field. While the Ford branch at Buenos Aires is assembling cars of 60-in. tread mostly at present it is expected that soon only cars with 56-in. tread will be produced. It will be a little difficult at the start to sell these in the Argentine camp, but Mr. Davies says it is possible to sell a 56-in. tread, and it seems that soon the 56-in. tread, will be standard throughout South America as it is in North America.

BAY STATE REGISTRATION

Boston, Mass., May 6—That the motor industry has been prosperous in Massachusetts during the last four months is shown by the great increase in registrations compared to the same period of a year ago and also the first quarter of 1915. The figures were so large that the highway commission issued them as an indication of prosperity and optimism. During April this year 21,452 plates were issued, or 30 per cent more than a year ago. While it is a substantial gain, it does not measure up to the 140 per cent gain during the previous month over the March figures. The figures given out up to April 30 show that up to date the state has received nearly \$1,300,000 from the motorists alone.

McCULLA RETURNS

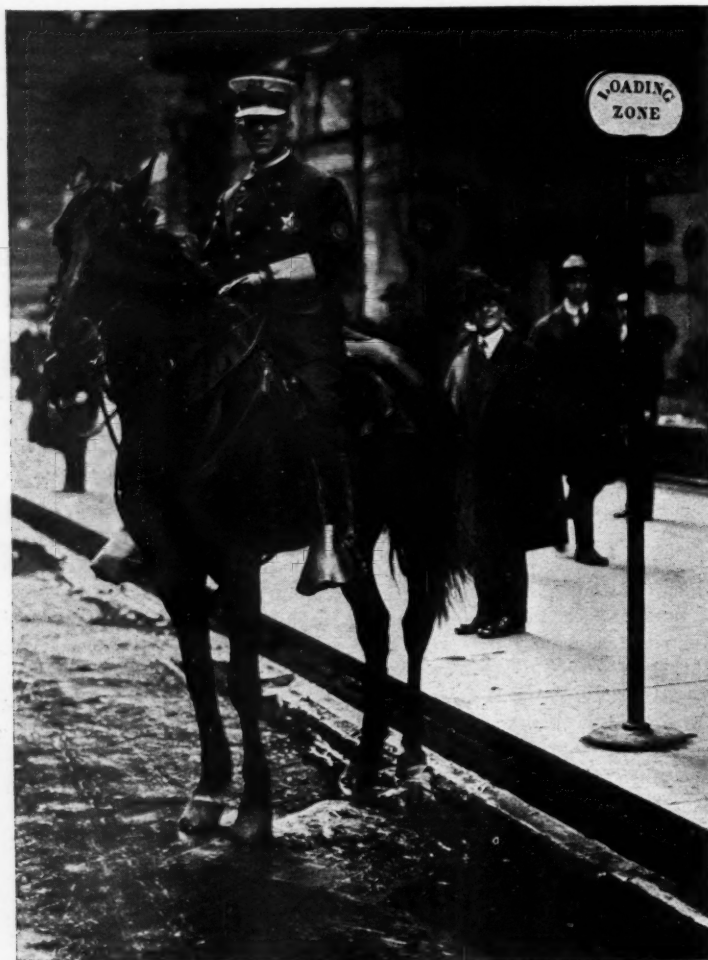
Toledo, Ohio, May 7—William R. McCulla, of the engineering department of the Willys-Overland Co., who has been in England on duty in the British army, has returned to the factory.



Los Angeles is training the Boy Scouts in motor car first aid work for the benefit of motorists

Solving Chicago's Traffic Problem

New Anti-Parking Ordinance Meets Protest
but Increases All Vehicles' Efficiency



Mounted officer keeps traffic moving through loading zone which is kept open for loading and unloading two street cars at one time

"EXISTING municipalities cannot be reconstructed, and, with both the motor car and the skyscraper centuries ahead of the theories on which cities are built and absolutely at war with the traffic capacity of any city, we are obliged to tinker with the old plan and fit it to the new conditions."

This statement was made by Darwin P. Kingsley, president of the Safety First Federation of America, at the Baltimore convention last December. In the last ten days Chicago has shown its resourcefulness in eliminating a large measure of traffic congestion in its downtown section known as "the loop." Virtually it has revolutionized the movement of traffic through the downtown district during the important periods of the day—the rush hours of the morning and evening. It has brought about a condition which Mr. Kingsley pleaded for

in his statement quoted above. The city of Chicago has tinkered with old conditions—if one may be pardoned the use of such an inappropriate word as "tinkered"—and the result has been the clipping off of a good number of years from the centuries mentioned in the statement in the paragraph above, at least, so far as motor cars are concerned.

In forcing the new regulation which prohibits the stopping of all vehicular traffic on streets within the loop which have street car tracks, except to load or unload, between 7 and 10 a. m. and 4 and 7 p. m. has not been without much protest on the part of motorists. Mounted police have enforced the new law to the letter. Besides the rule governing the parking of cars at the curb, the new ordinance prohibits all vehicular traffic to enter upon street car tracks except to pass another vehicle load-

ing or unloading at the curb in the restricted zone.

Briefly, the reasons for having this new regulation, which countless car owners criticize as being unfair, are these:

1 Traffic in Chicago's loop has long been a serious problem, affecting everyone who comes into the downtown district, and especially so during the morning and evening.

2 Two and three-minute street car service in rush hours is necessary to bring the thousands to the stores and offices and carry them home at night. This means that the street car tracks must be kept free from all vehicular traffic if the minimum of congestion is to be attained.

3 Heavy trucking begins early in the morning and with motor cars and other vehicles standing at the curb for any length of time, it means that these heavy, slow-moving vehicles as well as all other vehicular traffic moving through the loop have had to follow the car tracks in order to get through at all. While a block may accommodate four to six street cars, if the tracks are choked with other traffic the efficiency of the street cars is materially cut down.

4 With the rule effective prohibiting the stoppage of vehicles at the curb except to load and unload, the streets are reasonably clear during the rush hours. This makes vehicular traffic move more rapidly and increases the efficiency of the street car service many times over. Employers and employees alike look with much favor on the new ordinance, for it means that fewer minutes are lost in getting to and from the places of business.

The first day's violations of the new ruling numbered far in excess of 100, while the second and third days were nearly as heavy. Judge Kearns in the Speeders' Court found his courtroom so crowded mornings last week that he made an announcement from the bench that all those who wished to plead guilty to violation of the anti-parking ordinance might do so and be assessed the minimum fine of \$5 without costs. A few felt they could excuse their violation and would not plead guilty. The writer was in court three mornings and heard but one violator excused; all others were given a fine of \$5 and \$2.50 costs. The one violator excused said he left his car in front of the Federal Building and went in to enlist. Proof of this saved him the fine and costs.

Among those brought in the first day were City Prosecutor Harry B. Miller and



Chicago speeders' court looked like Monday morning at a department store bargain counter the first day after the new non-parking rule went into effect

Stephen A. Malato, former assistant state's attorney. On the latter's contretemps hangs the beginning of a fight that may result in a drastic modification of the rules.

Mrs. Malato drove her car to a downtown office building, left the car at the curb and went into her husband's office. When they came down a policeman was waiting with a summons. Malato insists he will carry the case to the supreme court if necessary. He believes there should be some ruling as to what is a reasonable time to load and unload.

Strenuous objections have been made against that part of the ordinance which makes the afternoon restriction hold good until 7 o'clock. This prevents many downtown diners from driving to a hotel or restaurant and leaving their cars in front.

However, the whole effect of the new regulations has brought a simplification of traffic problems in the loop. Driving through is a far easier matter for motorists and boarding street cars is infinitely safer. Everything moves more rapidly with the curbs clear except at cab stands. Minor modifications in the rules may be found advisable, but revoking the whole ordinance would be a public calamity. Other cities will do well to emulate Chicago's solution of traffic congestion in its downtown thoroughfares, at least, for a portion of the day.

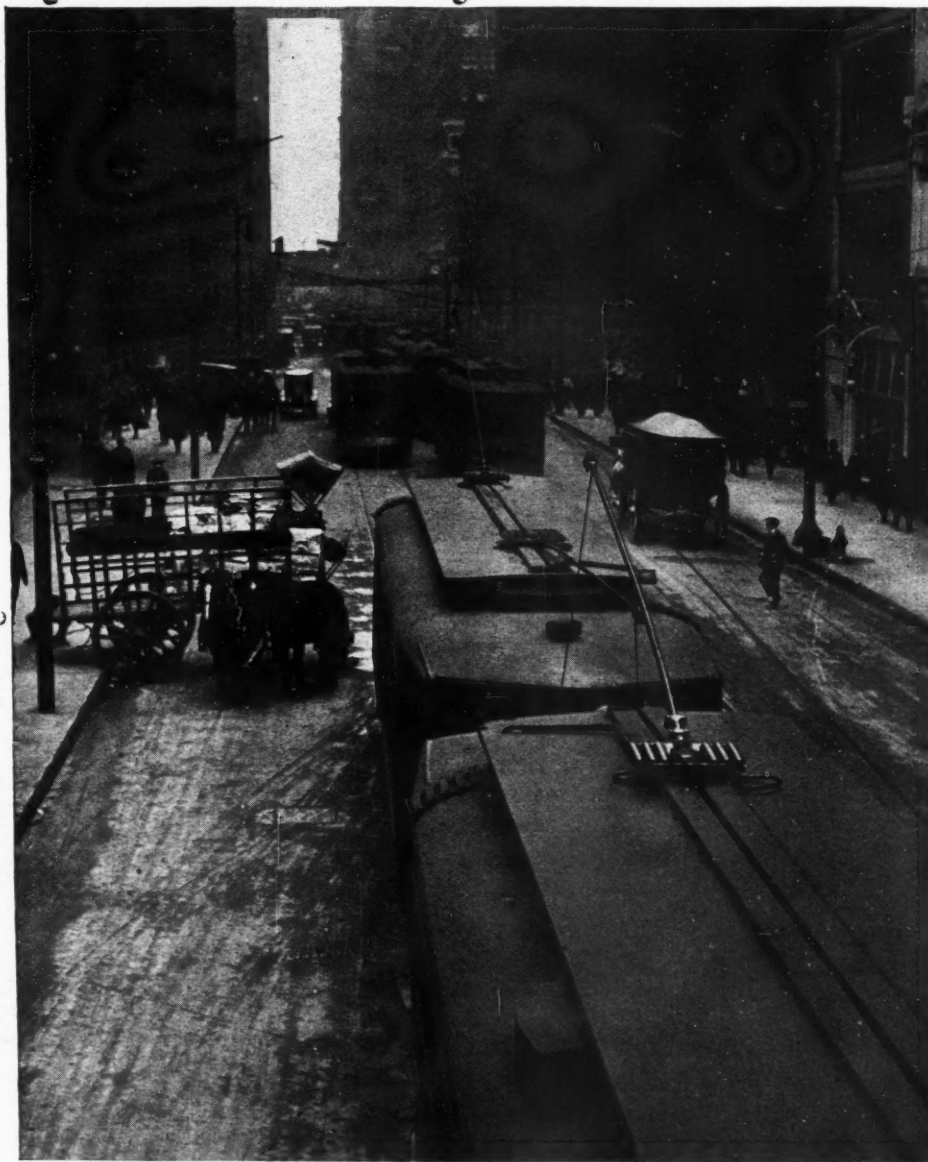
COLORADO SOCIABILITY RUN

Colorado Springs, Col., May 4—Final details for the motor car sociability tour of the Colorado Springs Chamber of Commerce have been completed, and the party will start on its journey over the Albert Pike highway to Tulsa, Okla., Tuesday, May 8. Eight cars and thirty-two passengers will make up the caravan representing the business and professional in-

terests of Colorado Springs and Manitou. The trip will take twelve days and will cover 1775 miles. A. J. Lawton, who was a member of the tour parties that represented Colorado Springs on the Texas trip in 1913, and the trip to Indianapolis over the Pikes Peak Ocean-to-Ocean highway in 1915, has been elected captain of the tour.

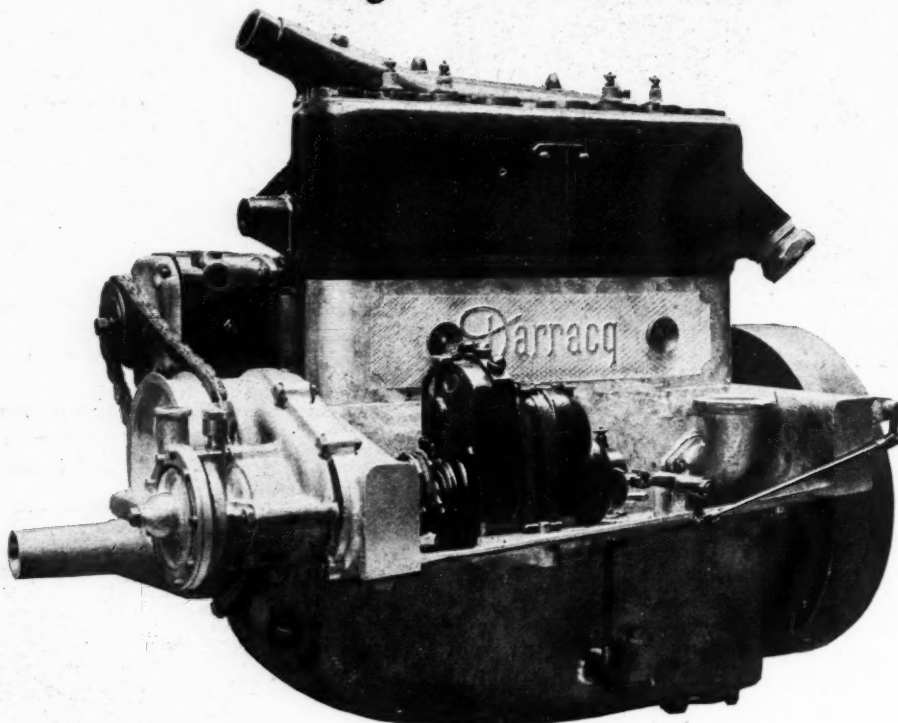
The tour party will have its first noon control at La Junta May 8 and the night control at Lamar, Col., on the same date. The other night controls will be Dodge City, Kan., Enid, Okla., Oklahoma City, Tulsa, Joplin, Mo., Independence, Kan., Wichita, Russell, Goodland. Sunday, May 13, will be spent in Tulsa.

The various highways to be used will be the Albert Pike highway, the Oklahoma-Texas-Gulf highway, the Ozark Trails, Jefferson highway, Oil Belt Route, Meridian highway, Golden Belt highway and Pikes Peak Ocean-to-Ocean highway. One of the principal purposes of the trip will be to arouse interest in the Albert Pike highway.



Madison street from one side of the loop to the other now is especially clear of standing vehicles each morning and evening

Battlefield Tests Bring Out Military Truck Defects



Combined oil filler and breather is a good feature, but an exposed oil level is bound to be choked with dirt

Weakness and Strength of Vehicles Under Fire as Expressed by An Authority

In Two Parts—Part II

By W. F. Bradley

A VIGOROUS protest must be lodged against the American practice of fitting internal and external brakes on the rear wheels. Perhaps under peace conditions, when every car is brought into a garage each evening and is washed every morning, the feature may be passable, but under war conditions, when cars are either on the road or standing in an open yard, a field, a garden, or a public square, and cannot possibly be washed, the full measure of the disadvantages of external brakes is revealed. On an external brake there are ten moving parts, adjusting nuts, screws, etc.—twenty for the pair of brakes—and every one of these parts is working in a constantly renewed bath of mud which the driver has no time or opportunities to remove. In counting up these parts the brake camshafts have not been included, for the bearings have a slight amount of protection against mud. On a properly designed internal brake the only exposed part is a yoke pin and even this could be protected by a gaiter if it were worth while. The consequence is that all these parts, some of which move every time the brake is applied and others only move for

adjustment, become solidly rusted until brakes stick and adjustment is impossible. The remedy is for the driver to hack away the solidified mud, crawl under the car and wash every pin with kerosene. The cleaning ought to be done at regular intervals, but it requires more than ordinary human enthusiasm to crawl in the mud under a car so long as the part will give reasonable service.

Place for Brake Adjustment

On paper and in the showroom it looks the correct thing to place the brake adjustment at the rear end of the control rods, just above the axle. In this position they enjoy a constant mud bath, and when adjustment is required it is found that the threads are so rusted and mud-choked that it is impossible to move the nuts or turnbuckles until the parts have been carefully cleaned with kerosene. The correct place for adjustment is at the front end, right under the floor board, where no mud can enter and the slight splashing of oil and grease prevent the parts rusting. The adjustment provided on very many cars is

inadequate to take up all the wear on the shoes. In some cases this was overcome by riveting an extension to the first lever just ahead of the balancing beam.

As a rule, brakes on all cars err by reason of too small an area. The most strenuous conditions are convoy work on crowded mountain roads, and the maker has rarely taken such conditions into consideration. There is an unexpected amount of brake work, too, on isolated vehicles having to pass slower vehicles and convoys on crowded roads leading to the front. This entails a succession of periods of quick acceleration and hard braking unknown elsewhere. In city traffic this may have to be indulged in for a few minutes; on some portions of the front cars are driven constantly under these conditions. On some Fiats, doing fast service on crowded hill roads it has been necessary to renew all the brake linings once every three months; yet these cars have a very liberal brake area. Some officers in command of Buick C4 ambulances state that the original brake linings had to be renewed after 2000 miles running. The writer only had experience of Ferodo linings on these cars,

and they certainly lasted four times this distance. Reports were received from some quarters that brake rods were continually breaking, and that welding was useless as a repair, for the metal would crack each side of the weld. The defect was got over by fitting new rods of Brt. M.S. $\frac{3}{8}$ -in. diameter. The writer never personally came across an instance of a brake failure.

A few cases have come to light of brakes being too powerful for the transmission, and one maker at least has found it necessary, as the result of war experience, to reduce the size of his transmission brake. With the brake drum unsupported at one end, there obviously is a limit to the size which can be adopted without transmission troubles developing. A few makers have discovered the necessity of having a bearing both in front and back of the brake drum, but the disadvantages of this are a more complicated design and greater difficulty in dismounting the brake shoes whenever relining becomes necessary.

All-Metal Wheels a Success

All-metal wheels have proved their worth in a remarkable manner on the Italian front. Trucks of $3\frac{1}{2}$ - and $2\frac{1}{2}$ -ton capacity, as well as the big tractors, are all fitted with cast-steel wheels. The $1\frac{1}{2}$ -ton chassis used either as fast trucks or ambulances, also all the fast armored cars and a number of the lighter 1-ton chassis, are fitted with detachable steel disk wheels, naturally with pneumatic tires. Wood wheels are to be found only on some of the older trucks in service long before war was declared, on a percentage of the staff cars, on the American ambulances, and on some of the older Italian and French cars converted to ambulances.

There is no doubt the Italian authorities have been led to the use of all-metal wheels by reason of the trouble developed with wood working under very varied climatic conditions. With the rare exception of cracked spokes, occasionally seen on a truck having been in service for a long time and subjected to rough usage, no cases of breakage or failure of all metal wheels were met or heard of. One truck, in hard service right at the front since the beginning of the war, was observed with five out of seven of its front wheel spokes cracked. The driver reported that this seemed to make no difference with the running of the truck, and that he would continue running until an opportunity came to go into the workshop for a general overhaul, which, incidentally, was very badly needed. Such incidents were rare.

The steel disk wheels proved ideal for rough service at the front. They were used on heavy armored cars capable of 50 miles an hour; they were dropped at speed into shell holes; they went over 6-ft. embankments; they figured in collisions, and they occasionally dropped off bridges into the river, but the writer fails to recall a single instance of a wheel breaking, or of a vehicle unable to get home by reason

of the condition of its wheels. Bursting shrapnel which would certainly have cut the spokes of a wood wheel, and probably caused it to collapse, had very little effect on the steel disk. In the matter of ease of cleaning there is no comparison between the two types. There were no opportunities of getting comparative weights of wood and steel disk wheels, but merely from handling the two it is imagined the steel disks are slightly heavier. This however, is of no importance on a 1-ton truck.

The size of wheel most commonly employed in Italian service is 880 by 120 mm.—34.6 by 4.7 in.—single wheels being fitted at front and twins at the rear. On all the $1\frac{1}{2}$ -ton chassis the front wheels were secured by five studs and nuts of about 18 mm. diameter. At the rear there were ten such bolts. All the wheels were drilled with ten holes, but five of them were not used on the front. Some of the armored cars, with 135 mm. section tires, and a very much higher speed than the $1\frac{1}{2}$ -ton trucks and ambulances were capable of, had only six bolts, and according to the drivers these were quite sufficient. It appears that these wheels had originally been designed for five bolts back and front, but, as in some cases the drivers had neglected to screw up tight, the number had been doubled. The writer handled a 1-ton Fiat, carrying a 50 per cent overload, with only the five bolts front and rear and never experienced the least trouble.

When twin pneumatic tires are used it is important that the two rims be set as close together as possible, leaving just sufficient clearance between the walls of the tires to prevent chafing. The reason is that at the front roads are repaired by dumping down stone and leaving the vehicles to roll it in. These stones are picked up by the twin tires, wedge themselves in between the two rims, and cut the walls of the tires. In some parts of the front round stones from the river beds are used for road making. These are not very injurious. At other points granite blocks from

wrecked villages are broken up and laid on the road. These stones are rough, have sharp edges, and are quite capable of cutting through the walls of both tires. This trouble is a really serious one, for at some portions of the front every car returning from a run of twenty-five miles had an average of three stones in its wheels. Sometimes these stones were so tightly wedged that they could not be removed with a crowbar and hammer; it was necessary to demount the wheels or rims. By putting the rims closer together only the smaller and less destructive stones could find a lodging place.

Different Wheel Types Used

None of the Buick and G. M. C. ambulances on the Italian front had demountable steel disk wheels. Some of them had demountable rims—single rear—held in position by a series of wedges; others the bolted-on type with split rim. Others had been fitted in England with the Challiner patent demountable rims—twin rear.

All these were very unsatisfactory and decidedly inferior to the steel disk demountable wheel. In the first class the five or six bolts had to be tightened up daily, or the wedges would work loose and trouble would ensue. There was always a certain amount of trouble, too, with shrinkage of the wood spokes. The split rims were really no advantage, for in ninety-nine cases out of a hundred it is the driver's own fault if he has to change a casing on the road. Also there were quite a number of nipped tubes with the split rims. The Challiner type was still less satisfactory. To take off the inner tire it was necessary to remove twenty-four nuts of $\frac{1}{4}$ -in. diameter, compared with either five, six or ten of $\frac{3}{4}$ -in. diameter on the steel disk type.

To prevent creeping on the Challinger, a steel plate with three holes, was riveted to each of the fixed rims, and through these holes were passed the valve stem and a couple of pegs projecting from the demountable rim. As water always found its way in between the two surfaces, the rims



A very satisfactory type of driver's cab as found on a Chatillon-Panhard truck



Some of the touring cars and ambulances back from the front for repairs

were always in a more or less rusted condition, and it was no uncommon occurrence for both pegs to break off, leaving only the valve stem to act as a stop against creeping. This was soon sawn through, and the tire of course went flat. The trouble was partially overcome by brazing the pegs in, instead of riveting them, but even then there was a very small margin of safety.

Testing Pressure Difficult

In some cases, too, the plate secured to the fixed rim would come adrift, and to replace it necessitated taking off the entire wheel. On the Challiner type the length between the demountable rim and the fixed rim is so great that the standard European valve stem will not come through, thus in order to inflate the tires it is necessary to take off the rims—eight nuts and a flange for each front and outer rear tire; twenty-four nuts and three flanges for each inner rear tire. The consequence was that with these wheels tires were always run under-inflated. Unless ordered to do so, or time was hanging very heavily on his hands, no driver would take his rims off to test air pressure. With steel disk type, the valves of both outside and inside wheels were more accessible than on the ordinary fixed wood artillery wheel.

The most unsatisfactory job on an army car is not changing rims or wheels, but is the jacking up of the car. Except under very exceptional circumstances tires are not changed on the road side, for it is rarely that pneumatic tired trucks make individual trips of more than 60 miles, and with two spares—either rims or wheels—there is sufficient margin against tire trouble. In most sections the drivers are not allowed to carry a spare tube, so that if they have more than two punctures, they are reduced to putting on a patch, coming home on the rim, or with a single tire on one of the twin rear wheels. There are plenty of good jacks on the market, but

the writer has never yet found a jack made for the car on which it was going to be used, nor has he seen a car designed with a special seating to receive a jack.

Picture the following scenes, and perhaps it will help to drive home the necessity for a better system of jacking than that now prevailing.

Midnight, summer time, a big battle raging five miles in the rear, roads thick with dust and heavy with ammunition wagons and reserve troops hurrying to the front. The ambulance is loaded with thirteen wounded; it is designed to carry eight, but the dressing station attendants refuse to believe it. One of the single back tires has burst, and after crawling on his hands and knees under the car, the driver finds that there is only a bolt head to receive the jack, and that it is impossible for him to lift the car with the heavy load aboard. Some of the men can-

not walk; others are so tired that they will not get out.

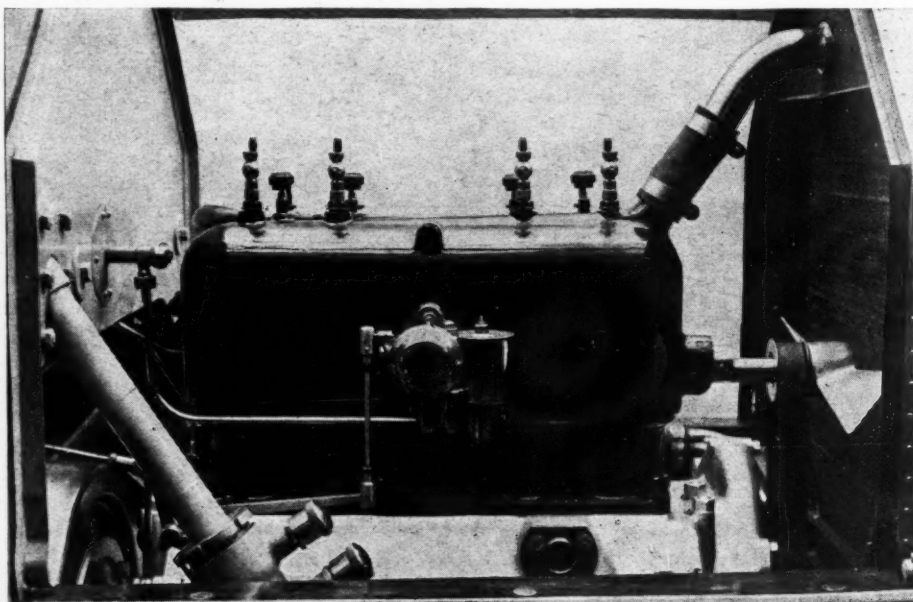
Or this scene: Winter time, roads heavy with mud as the result of fifteen days constant rain and much traffic. On the approach to the one-way bridge a front tire goes, and the driver finds, as is always the case, that the jack will not lower sufficiently to go under the axle when the tire is deflated.

The only possible way is to pull out the floor boards, run the punctured wheel on them, and then use the jack. While this is being done the enemy begins to put in the twenty double-effect shells—shrapnel and high explosive combined—which are reserved daily for this bridge head. The soldiers working in the neighborhood disappear as if by magic as soon as the whizz of the first shell is heard, for they know by experience how many will follow. The two military police on duty at the bridge head drop into their sand-bagged dug-out; then a head emerges cautiously and a voice asks why in the name of the Holy Madonna the driver cannot get away quicker. Only the men inside are silent; they have had their visitation and are not afraid of anything worse. These are not imaginary cases; they are taken from life, and are a few of hundreds.

Suggests Permanent Jack

It seems almost elementary common sense that the car manufacturer should design his car to receive a jack and supply a jack to fit the car. In most cases a jack which will go under the front axle is not high enough for the rear axle. Generally there is a satisfactory place for the jack under the front spring seating; but at the rear, if the axle has a truss rod, there is no place for the jack other than a bolt head. Further, most of the jacks supplied to the army will not lift a vehicle carrying a 1½-ton load.

Why is it not possible for the heavier pneumatic-tired vehicles to be fitted with



A neat design of truck engine. Fan does not sweep sufficient area of radiator

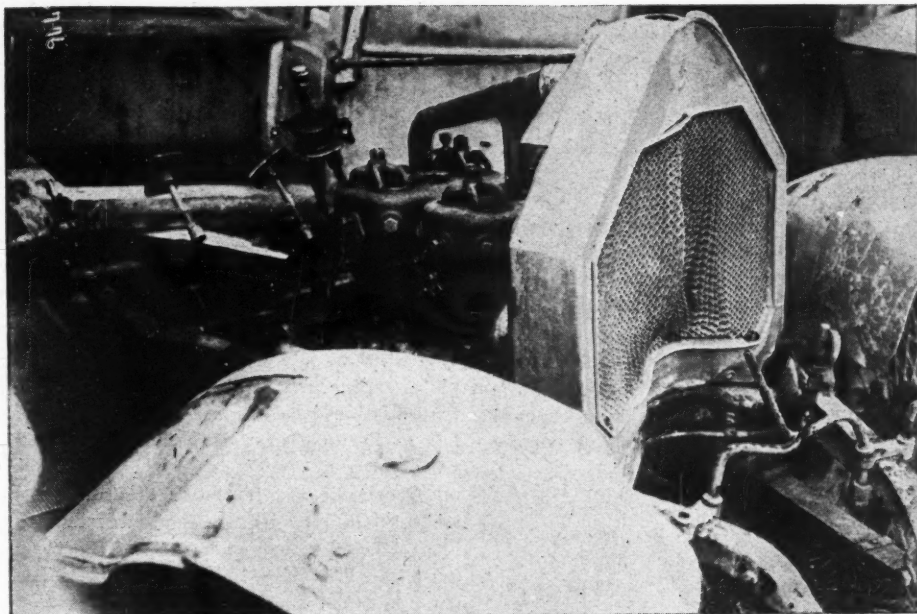
a permanent jack allowing the car to be raised without any manual effort in much the same way as a motorcycle raises his machine? There are no great mechanical difficulties in the way, and the matter is certainly worthy of attention. Most army drivers would prefer an accessory of this nature to a power tire pump, or a self-starter.

Man at Wheel a Factor

Not enough attention is paid to the material comfort of drivers of army trucks and cars. The limiting factor in the usefulness of a car is not any of its mechanical organs, but the man at the wheel. No matter how elaborate the preliminary preparations, the outbreak of a battle makes it necessary for men to work to the limit. Whether their limit will be 10, 12, 16, 24, or 36 hours at the wheel depends largely on the care given to the driver's comfort and to ease of control. It is certain that the car will not fail if it is run twice 36 hours without a break.

Why should a spring-cushioned and horsehair seat be necessary for a well-sprung touring car, and a thin, springless cushion be sufficient for the driver of a truck? Why should the emergency brake lever be convenient to the hand of the touring car driver and so inaccessible on the truck that the driver has to bend until his nose is on the steering wheel before he can reach it? Why should the touring car have the protection of side doors, cowl and a windshield and the man on a fast truck or ambulance be left in the open?

For the truck driver, there should be a folding top quite independent of the top over the body. This also applies to ambulances. The writer has a decided objection to fixed extensions over the driver's head. To be of real use against rain the top should be low and pass a little distance ahead of the dash. But such a top makes night driving without lights very difficult indeed. Every driver who has had experience of this class of work will ad-



This Belsize car embraced a tree with the result shown

mit that he would rather be soaked in rain than have to drive at night over a dangerous road with a low and deep top. An almost completely inclosed cab should be provided for every army driver at the front.

This means a fairly high dash, side doors, preferably easily removed, a folding top, and a leather apron screwed to the top edge of the dash and hooked to the underside of the top, about level with the driver's chin. The English, with their great love of personal comfort, have built most of their driver's cabs in this way. The only disadvantage of their design is the fixed top, but it is probable that the men responsible for the design had not had much experience of night driving on unlit roads. A minor point is that the top should be secured to rather stout steel uprights from the dash and not by means of straps or wire cables. The reason for this is that on many portions of the front

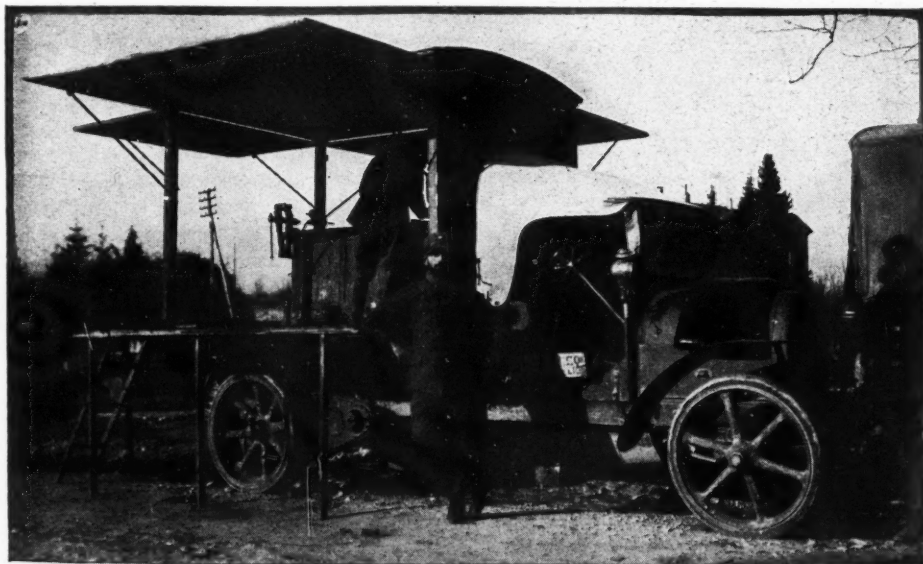
the roads are shut off from the enemy's view by means of screens right across the road, just sufficiently high to clear the tops of trucks. In stormy weather these screens are liable to be destroyed and the wires to which they were attached will sag until they are about level with a driver's neck. There have been some accidents and many narrow escapes from this, and although the uprights would not be sufficiently strong to break the wire, they would tend to throw it upwards, clear of the driver's head.

Driver's Comfort Neglected

The Italians have not paid all the attention which could be desired to the comfort of drivers. The regulation truck has a folding top with side curtains, quite independent of the truck body—which is the correct practice—but has no side doors, nor a leather or canvas waterproof apron from the top of the dash. On the ambulances the roof is extended over the driver's head, and is sufficiently high not to interfere very much with night driving.

However, it admits an extraordinary amount of rain. In consequence, drivers have displayed a considerable amount of ingenuity in making their quarters more comfortable. Window frames have been taken out of wrecked houses, and after glass had been fitted were erected above the dash. Side curtains would be secured, so as to shut in the sides of the car completely, and one of the floor boards removed to give the driver the benefit of the hot air from the engine.

Little if any gearbox trouble was experienced in service on the front. Not a single case can be recalled of a Buick or G. M. C. gearset having failed under the most strenuous work. These gears, however, were very noisy and changing down was most difficult. Probably in private service this would not be apparent, for even on the good roads some distance to



A Fiat traveling repair shop, many of which are used on the Italian front

the rear, drivers would very quickly pass into high and rarely had any need to change down unless the vehicle had previously been brought to a dead stop. On the hilly and muddy roads near the front a lot more low-gear work had to be done than the designer had ever imagined, and changes down had to be made while the vehicle was in motion. Even the most experienced drivers failed to do this silently. Further, the cars absolutely shrieked when running on second gear. At some points this was a real disadvantage, for the road was so near the enemy's lines that the howl of the gears could be heard, and the cars would be fired at on reaching exposed points. The distance was judged not by sight, but by sound.

Changing Gears Difficult

Passing from second to first gear was so difficult that some drivers would stop entirely rather than attempt the change while the car was in motion. The final gear reduction of these cars was 6 to 1, which necessitated the use of low gear for comparatively long periods when roads were heavy. One of the engineers in charge of a section using Buicks recommended to headquarters that the final reduction should be 8 to 1. This was not done because the low gear was too high, but in order to avoid the difficult change across the gate from second to first, on some of the winding hills. It was calculated that with the lower final gear ratio men could keep on second, only using first for getting away from a standing start.

Two main types of clutches were employed: leather cone and multiple-disk running in oil or dry. Correctly designed, there was not very much to choose between the two. The cone types were apt to be fierce unless treated occasionally with collar oil, and most of the multiple disks had to be washed out and filled with fresh oil on an average once a week. Some of the supposedly dry type only ran well treated with a thin oil, or better a mixture of oil and kerosene.

Probably the C4 Buick truck was originally designed to carry single wheels on the rear, and where single wheels have been used no rear axle trouble appears to have developed.

Quite a considerable number of these cars have been sent to the front for ambulance work with twin rear wheels, and with this change there have been several cases of axle failure. The differential shaft tapers are certainly too small for the extra strain of twin wheels, for there have been several cases of the shaft breaking just back of the taper. In some cases this was provoked by neglect to keep the rear wheel hub tight on its taper. When not driven home sufficiently in the first instance, a certain amount of play set up and the keyway was "chewed up." Even if the shaft did not break, the keyway had to be trued up and a new key fitted. All the Fiats have double keyways, at 180 deg.,

and developed no weakness under this heading.

Unit construction of engine and gearbox does not show up very satisfactorily under the heading of repair facilities on war service. There is a lot to be said in favor of the system from a factory standpoint, and not very much against it for peace service, but on war work every engine has to come right out of the chassis once in twelve months on an average, while gearboxes will last three times that period without attention. One section, which is quite typical, has a record of sixty-five complete engine overhauls and not a single transmission repair. Much of this work has to be done in the open air, or under very flimsy covering, and the task is very much complicated if the transmission has to be taken out with the engine. The dash has to be taken away; sometimes the body must be removed; all electric light connections must be broken, and usually a block and tackle are indispensable. Many an engine overhaul has been carried out by a couple of men, who for ease of handling took the cylinders off first and lifted the crankcase out afterwards, but it is very doubtful if they could have done the job under war conditions if the transmission had had to come away at the same time.

Uniform Design Not Always Best

It cannot be maintained that war experience has proved the necessity of uniform design of trucks. Indeed, if truck experience is linked up with aviation engine experience, the evidence is strongly in favor of giving manufacturers the great-

est possible liberty; in other words, specifications should deal with ends, not with means. Any other policy is bound to have a stifling influence on the development of design.

The main points on which uniformity can be insisted are four-cylinder engines, not less than three main bearings, magneto bases and couplings, carburetor flanges, four-speed gearsets, body dimensions and particularly body height, clearance, metal wheels—either cast steel or steel disk—and greater uniformity in tire sizes.

Type of Trucks Used

In the Italian army, the 3½-ton truck, which forms the backbone of the service, has a four-cylinder engine averaging 319.8 cu. in. piston displacement. This is the average of the five leading makes of trucks, and compares with 365.7 cu. in. average for twenty-two American trucks carrying 7000 lb. load. It is to be noted, however, that while the great majority of these American trucks have three-speed gearsets, the Italians invariably have four.

For conditions on the Italian front a lower number of speeds would certainly be disadvantageous. The average stroke-bore ratio on the Italian trucks is 1 to 1.73, the highest being 1 to 2 and the lowest 1 to 1.47. The average for twenty-two American trucks of similar load capacity is 1 to 1.28.

While the trucks, on the whole, have been quite capable of doing the work required of them with the loads they were designed to carry, the tendency of war service has been to create a feeling in favor of slightly larger engines. Trucks of 3½-ton capacity with 340 cu. in. engines have been able to face all conditions; but some of less than 300 cu. in. have revealed themselves as slightly underpowered for strenuous war service. European conditions in general and the high cost of gasoline in particular, have tended towards the smallest possible engine capable of doing the work under average conditions. This tendency, in some cases, has been carried too far.

There is nothing to prove that circulatory lubrication is better than any other system. On the Italian front, full pressure and circulating with troughs worked side by side. There was more trouble with the latter than with the former, but this was not due to the system itself, but to details in the bearings and inadequate filtering. It is not sufficiently realized that on war service drivers have to take any oil available, and it may vary from thin Ford oil to gearset lubricant. If a first-class magneto is fitted, a battery is only an encumbrance altogether out of place on a war truck. Not enough attention is usually paid to ignition wiring to prevent chafing and to keep out wet. The stock Ford gave a lot of trouble in this respect.

Extremes of wet and dust make Italian



Artillery tractor climbing difficult pass at the front

conditions similar to those often encountered in America, and more provision should be made to keep this dust out of the carbureter and the crankcase breather. It is difficult to abolish engine shields, particularly if the engine is mounted on a flexible sub-frame. It is not difficult, however, to design an engine shield which can be let down and put back as easily as opening and closing a door.

It is surprising that some shields should be so good and some so bad. If the crankcase has cast webs, it is essential that the flywheel be completely inclosed, and an adequate shield for this and the gearset is apt to be much more complicated than full shielding.

Radiators Might Be Interchangeable

Interchangeability of radiators would be a very good feature, but it is difficult to see how it could be carried out while engine design varies so much and no two engines require the same amount of cooling area. To make this provision really effective, water passages, valve area, port area and exhaust manifold would all have to be studied and rendered more or less uniform. It would certainly be advisable to abolish the belt and make the fan gear driven, as is now done by Spa. A radiator guard is absolutely essential. Front fenders suffer more than radiators from minor collisions. They should be attached by two stout brackets to main frame members and be entirely independent of the running boards. A uniform type of fender and mounting could easily be arranged.

Four-speed gearsets are essential for army service under varied conditions. In order to obtain a symmetrical layout of the gearset Spa has abolished direct drive on all its trucks and has reduced annular ball bearings in the transmission to two types and one type of thrust bearing. Also all joints are lapped. This is an important matter from the standpoint of the repair departments, and deserves to receive very close attention.

Practically all the Italian shaft-driven models have a two-piece stamping for rear axle and propeller shaft housing, these two halves—upper and lower—being bolted together. A yoke is mounted on the forward end of the housing, and there is but one universal in the system, this being in a separate metal housing just back of the gearbox. In service this type of axle has stood up very well.

From a repair shop standpoint, with few facilities available, there is the disadvantage that before any work can be done the entire axle and propeller shaft must be taken down. This in itself is a simple job, but when the unit is out a big series of bolts must be withdrawn to disassemble the two halves of the housing, and the replacing of this unit is rather a delicate matter. This of course applies to work done in temporary repair shops at the front; with factory assembly the job is simple.

Every make of axle having Hotchkiss drive could be demounted and assembled much more rapidly than the Italian type. Hotchkiss drive is not made in Italy to any appreciable extent, but the few foreign cars and light trucks working there with this system were satisfactory. There is no reason why Hotchkiss drive should be taboo on principle.

Inclosed chain drive is in such an immense majority on the Italian front that it is difficult to make comparisons. There are no worm-driven axles in service in Italy. One foreign make of double reduction axle gave endless trouble and the trucks could never be loaded to their full capacity. The same happened to these trucks on another front. It would not be just to blame the system, however, for it was obvious that there were many defects of material and design in this particular make.

In truck specifications, more attention should be paid to a uniform turning radius. This is important on all fronts, but particularly so under the mountain conditions of Italy. As an instance, Buick and G. M. C. convoys had to be kept separate, for the latter could not tackle hairpin turns which were negotiable by the former. Trucks working at the front are constantly obliged to turn on narrow and rough surfaced roads. An inadequate lock causes much delay, and even one truck can hold up an entire convoy. Steering knuckle tie rods should certainly be located behind the front axles.

Cast-steel wheels have proved their worth to such an extent that the wood variety will soon be an object for the museum. There is easily room for more uniformity in tires. The usual size on Italian service, for $3\frac{1}{2}$ -ton trucks, is 900 by 120 twin—35.4 by 4.7 in.—an alternative

being 50 by 5.5-in. twin. In some cases very small diameter wheels have been adopted as the quickest and easiest way of getting a low gear ratio when work has to be done on steep hills with good surfaces. From a tire standpoint this plan is not very satisfactory.

Practically the standard wheelbase on Italian $3\frac{1}{2}$ -ton trucks is 141 in., with an available body length of 156 in. — distance measured from dashboard. Electric lighting has not proved very satisfactory in war service. Oil lamps and a single acetylene headlight on the dash are adequate and simple. It is folly to put a headlight out in front of the radiator. Exhaust pressure fed gasoline gives trouble in war service, no matter how well the system is installed. When pressure feed is used an auxiliary hand pressure pump on the dash is indispensable. Dash should be metal, not wood. Driver's top must be independent of top over body of truck. A road sprag is essential. Towing hooks should be fitted to all four corners of chassis, both trucks and ambulances. Bolts are preferable to rivets for attaching towing hooks. As result of war service, some makers are now bolting their frames together instead of riveting them. Ambulances without towing hooks often have their rear cross frame member bent by using it for towing.

Tool Equipment

Tool equipment should comprise a set of wrenches to fit all nuts on truck, mag-neto wrench, two screwdrivers, pair pliers, valve lifting tool, carbureter nozzle wrench, two files, grease gun, oil can, a powerful jack, can of soft grease, one gallon of engine oil—minimum—a wood lever armed with sheet steel, not less than 6 ft. in length, and a spade. These two latter items are indispensable for getting a bogged truck on to the road.

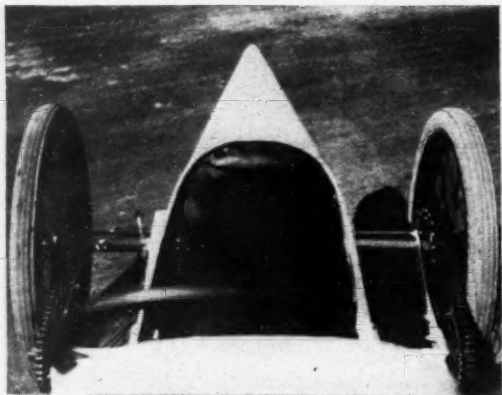
Theoretically, every truck going in war service should carry a liberal supply of spares comprising valves, plugs, nuts, cot-ter pins, washers, electric cable, carbureter float, etc. In practice to give these out to every driver would be equivalent to throwing money away. No matter how severe the discipline and how good the organization, drivers will not take care of spare parts; when a part has been lost the recognized practice is to borrow that part from the next car during the driver's absence. Drivers are continually complaining that radiator caps, hub caps, greasers, oil cans and tools are stolen by other men who have lost these articles. The only practical system is to give each driver the necessary tools and place all spares in charge of a mechanic who will give them out as required. If the trucks are working from a fixed base, the parts will be kept at that base. If the trucks are constantly on the move, then the spares should be placed in charge of a sergeant or corporal. One set of spares for six cars is quite a sufficient proportion.

MOTORS LEAD RAILROADS

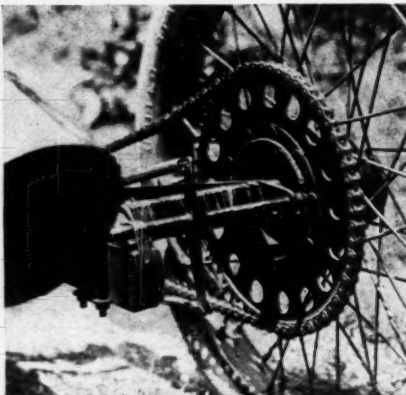
New York, May 4—American transportation now must look to the motor car as its chief factor. The car has caught up with and passed the railroads in importance as a factor in transportation in this country. In a recent issue, the *Wall Street Journal* declares that motor cars will carry many more passengers than the steam lines this year.

On a basis of 3,000,000 passenger cars in use this year, and an average mileage per car of 6000, the motor car mileage for 1917 will be 18,000,000,000, assuming an average load of three passengers. The passenger mileage by motor for 1917 will be 54,000,000,000. Railroad traffic now amounts to 35,000,000,000 passenger miles yearly, which is less than the passenger mileage of motor cars, if we assumed an average load of two.

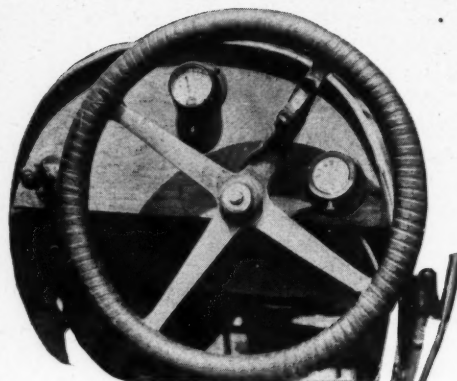
Motor car competition affects chiefly the railroads in the thickly settled eastern portions of the country, this authority states, the big cities and the recreation regions.



Rear-end view of one of the speedsters. Note the streamline effect



Close-up of rear-axle drive and internal-expanding brake assembly on Hartz' speedster



The dashboard on some of the tiny cars resembles its big brothers

The Junior Racing Car

Its History and Construction

Part 2

By Harry H. Hartz

THE first type we will call the Class A cars. In this class will be the cars resembling such creations as Earl Cooper's Stutz, Dario Resta's Peugeot, the Delage, etc., while the Class B cars take the form of the Christie and the Fiats.

The first glance at the Class A car shows a tiny creation with 20-in. wheels, a 36-in. tread, a 60-in. wheelbase. Closer inspection reveals the fact that the engine is hidden under the hood, that it delivers its power to a jackshaft by V-belt or chain transmission and thence from the jackshaft to the rear wheels by either one or two chains or one or two V-belts. The bearings for the jackshaft may be of bronze or, as is more often the case, babbitt or even ball races may be used. Semi-elliptic springs are observed in the front while semi-elliptic and cantilever types vie for popularity on the rear end. The gasoline and oil tanks are generally mounted on the rear and the brakes are external contracting on pulleys fastened to the rear wheels.

Owners of Class A

Many of this type of car have been constructed and for close resemblance to their big brothers, they are better than the Class B creations. Earl Cooper has three of these cars for his own amusement while Miss Katherine Stinson, famous aviatrix, is also the owner of one. Art Smith, the boy birdman, built eight of this type car in San Francisco last year and with them made a tour of the Orient, creating no small amount of excitement and much favorable comment and interest.

The Class B car presents an entirely different view to the eye. The class B car is equipped with 28-in. wheels, motor-car or motorcycle types; has a tread of 42 in., a wheelbase of 72 in. The most noticeable feature to this type of car is the position

of the powerplant with relation to the rear wheels. This instead of being placed under the hood is fastened to the left and outside of the frame, in close proximity to the rear wheel and generally drives with one chain direct to the rear wheel sprocket. However, several other methods of transmitting the power are used. These will be taken up later.

The advantages of the motor in this position are manifold.

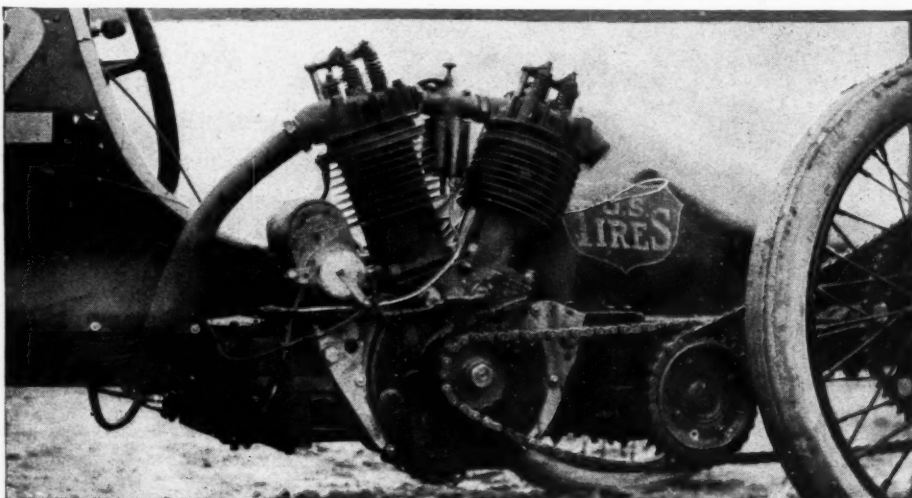
In the first place, it closely connects the source of power with the driving devices; furthermore, it eliminates long chains, places the powerplant at a point where it is of easy access, and most important, it places a weight on the left side or inside of the car in making the turns on a race course and tends to hold this side down, which aids in securing traction and

preventing skidding. This is the type car with which I have achieved my success.

In the beginning, it must be remembered by aspirants to junior car honors that the old bromide of "perseverance, ingenuity and patience are the three necessary factors for success" is more than applicable in the case of the youth who contemplates the construction of a juvenile racing car.

There are few parts manufactured which can be used in the construction of typical junior racing creations. Intuition and a mechanical trend of mind coupled with a little money, quite some time and the above-mentioned traits of perseverance, ingenuity and patience and any youth of fifteen or over will be able to build one of these tiny racing cars.

After the germ of a desire to build one of the cars has incubated into a real effort, the first point to be considered is the type of car which is desired. This is merely a



Here is the engine that propelled Henry Hartz' miniature racing creation a mile on the Ascot speedway in 54 sec. Observe the shortened exhaust pipes. Also note that the clutch has been removed to eliminate possible slippage

matter of taste, but it is impractical to incorporate principles of one into the other. For instance, it would be undesirable to use 28-in. wheels on a 36-in. tread car; that is, if real success were to be attained.

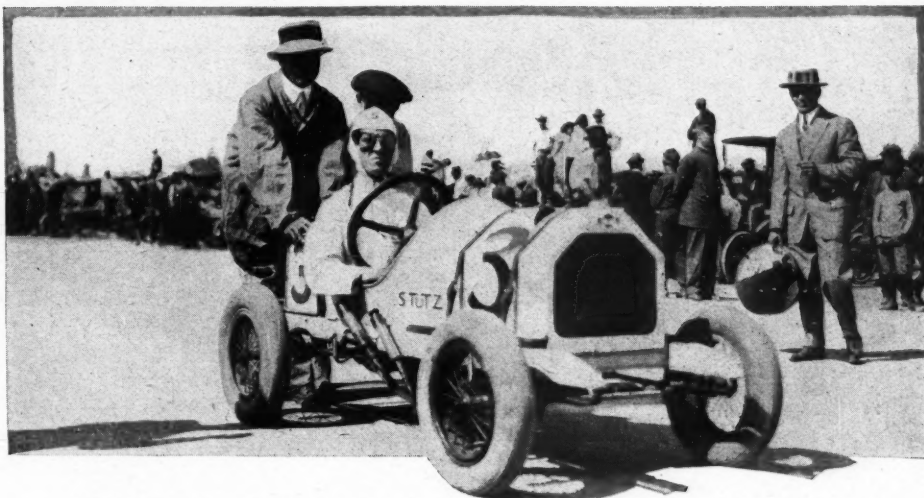
Both types are equally good in the matter of speed, ability to hold the road at a high gait and general lasting qualities. Model A has a wheelbase of 60 to 68 in. and a tread of 36 in. It has been found that with 20-in. wheels this tread and wheelbase are necessary to establish the balance of the car, the factor which makes it easy or hard to handle at high speed. A shorter wheelbase on this model or a variance in the tread tends to make the car unmanageable in making turns at high speed.

In Model A the motor is carried under the hood and is held in the frame by braces made of heavy strap iron, usually with lighter ones over the top of the motor, fastened at convenient places. The drive is by single chain to countershaft and from countershaft to rear wheels by one or two chains or one or two V-belts, whichever method the builder's choice calls for.

Differential Is Unnecessary

With the narrow tread and short wheelbase these cars carry, there is little need for a differential. In many of the models a three-speed motorcycle transmission is used. These, as well as the powerplants, can be purchased from practically any second-hand motorcycle dealer, or if the fancy dictates, from the manufacturers direct. The transmission, as a rule, is found only on the high-priced cars. When used it is placed on iron supports between the motor and transmission. If the car is to be used for racing on track or road, as they are used in California, a transmission is an unnecessary adjunct. A great disadvantage in the transmission is the fact that it necessitates the usage of an extra chain which not only means friction but an added source from where trouble can be expected.

The frame in either model is made from 1- by 3-in. ash, well-seasoned and straight-grained. This material can be secured from



Gil Anderson's famous No. 3 Stutz was a favorite with one of the junior drivers, as you will see here. He is starting on a mile trial against time. This is one of the best of the class A cars. Nearly exact duplicates of this creation are owned by Earl Cooper, Art Smith and Katherine Stinson. They are not quite as fast as the class B models

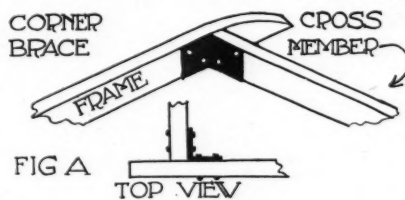


FIG A
TOP VIEW

SEMI ELLIPTIC SPRING

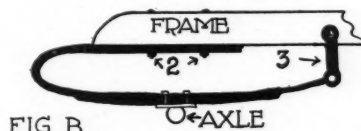
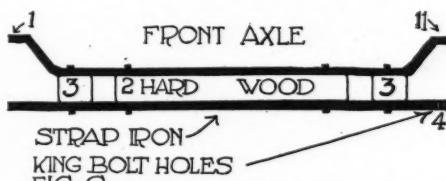


FIG B
O-AXLE



Figs. A, B and C showing construction of frame, springs and front axle

any planing mill and should be finished on four sides. In the Model A, the side members must be cut at a length of approximately 75 in. and the cross members 17 in. The frame is held together with angle iron braces placed in the four corners and reinforced, perhaps, with long bolts going through the frame from side to side. This angle iron as well as the supports for the motor and other necessary parts may be secured from any blacksmith.

When purchasing the wood for the frame, it would be well to have the planing mill round off the ends of each side member, as springs are fitted to the tip of these. If this is not possible at the mill it can be done at home in a very few moments.

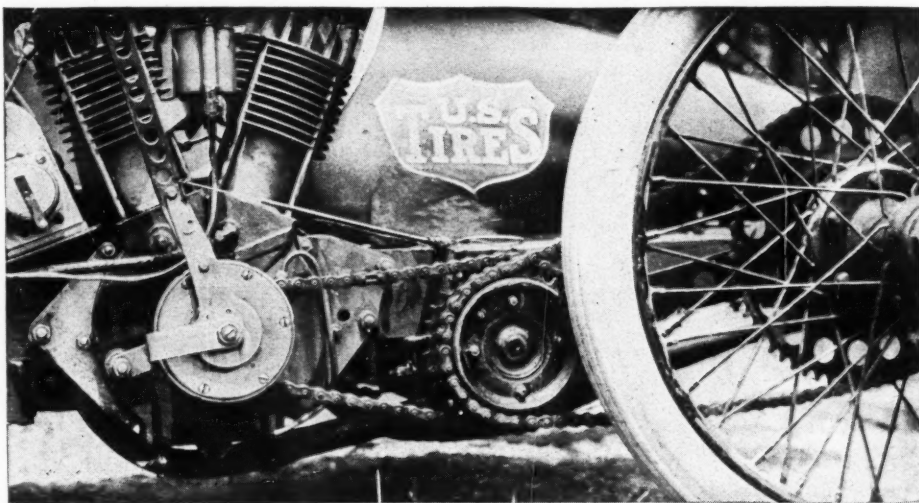
Spring Suspension

After the frame is assembled the next thing to consider is the spring suspension. Some of the newer cars, such as the Model B, are equipped with miniature cantilever springs in the rear and semi-elliptic springs in front. Very serviceable spring action can be secured by the use of semi-elliptic springs on both front and rear, however, and much work is eliminated.

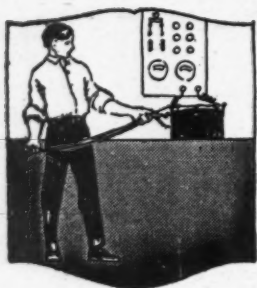
The springs for this model should be made of a good grade of spring steel the width of the top side of the frame member or in this case 1 in. The weight of the car will have to be taken into consideration when this feature is devised. A car the weight of the Model A, about 375 lb., will take the original spring and perhaps one or two leaves, depending upon the gage of the steel used.

The length of the springs in this model should be approximately 18 in. The springs must be fastened to the top of the side members both front and rear, as is illustrated in Fig. B, No. 2, with two $\frac{3}{8}$ -in. carriage bolts which go through the top side of the spring and through the rounded part of the side member. The rear end of the front and the front end of the rear springs are fastened, as is illustrated in No. 3, with

(Continued on page 39)

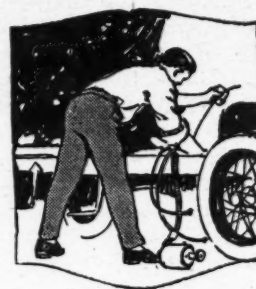


Illustrating method of drive popular on several of the junior cars. Drive is from the engine on the side to a countershaft by single chain and from the countershaft by a pair of chains to the rear wheels. Notice holes bored to lighten chassis



Electrical Equipment of the Motor Car

By David Penn Moreton & Darwin S. Hatch.



Editor's Note—Herewith is presented the forty-second installment of a weekly series of articles begun in MOTOR AGE issue of June 29 designed to give the motorist the knowledge necessary to enable him to care for and repair any and all of the electrical features of his car, no matter what make or model it may be. At the conclusion of this series, "Electrical Equipment of the Motor Car," with additions, will be published in book form by the Class Journal Co., Chicago, in a size to fit the pocket conveniently.

The fundamentals of electrical circuits of the motor car were explained through their analogy to water systems, and the relations of current pressure and resistance were brought out. This was followed by an explanation of series and multiple circuits, how electricity is made to do work in lighting, starting, signalling, etc. Calculating the capacity of a battery for starting and lighting and the cost of charging storage batteries and determining the torque a starting motor must develop were explained. Action of primary batteries and dry cells was considered. A section was devoted to the makeup and action of lead and Edison storage batteries, and another to the care of lead batteries in service and the best methods of charging them. Magnets and electromagnetism then were considered, and the principles of generators and motors explained.

Part XLII—Operating Voltage

STARTING, lighting and ignition systems may be classified according to the value of the operating voltage into two main groups as follows: Single voltage systems and multiple voltage systems.

Single-Voltage Systems

A single-voltage system, as its name indicates, is a system employing a single voltage for all the electrical operations. The value of this voltage, as used at the present time, is in the great majority of cases either 6 volts or a multiple of 6 volts, such as 12, 18, etc. The selection of the value of 6 as a unit is due to the voltage required in operating the old battery ignition systems, when dry cells were used and the three storage cells seemed to give very satisfactory results when used to replace the dry cells. The advancement made in the last few years in the manufacture of efficient low-voltage charging generators and motors has done a great deal toward making these lower voltages standard rather than the higher values as originally used. The filaments of the lower voltage lamps are more rugged than those of the higher voltage ones of the same candlepower, which is in favor of the use of the lower voltage system. The losses in the lower voltage systems are apt to be quite a bit greater than

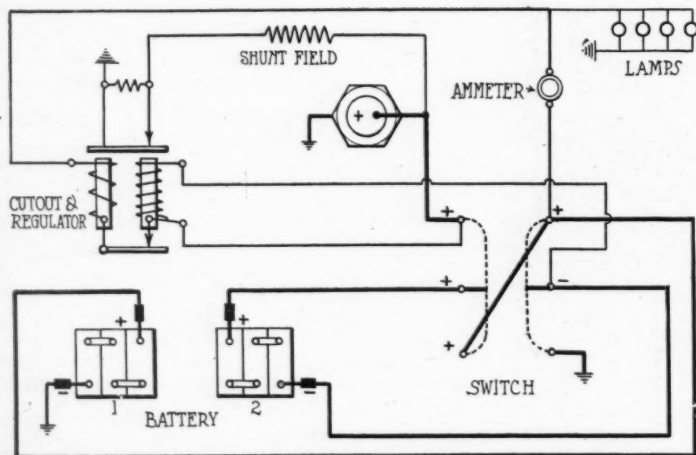


Fig. 245—Simms-Huff system, which is a multiple-voltage system in which the two battery sections are connected in series

in the higher voltage systems, due to the fact that a higher current will be required for a given power unless a larger size wire and larger switch contact areas be employed.

Multiple-Voltage Systems

Multiple voltage systems are those employing more than one voltage. In systems of this kind two voltages are usually employed, one for charging the battery and then a higher voltage for operating the starting motor. In such systems the battery usually is split into two sections. These two sections normally are connected in parallel, and the voltage of the charging generator is such that the battery may be charged while connected in this way. A change in connections usually is made at the starting switch when the starting motor is to be operated, which results in the two sections of the battery being connected in series, and the voltage applied to the starting motor is that of the two sections combined. A good example of a system of this kind is found in the Simms-Huff system, as shown in Fig. 245. The connections are shown diagrammatically in Figs. 246 and 247 for the charging and starting position of the starting switch.

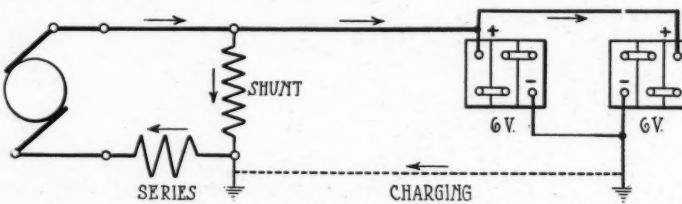


Fig. 246—The charging position of the starting switch, showing the connections at that position

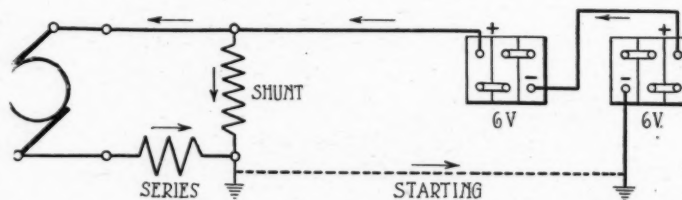


Fig. 247—The starting position of the starting switch, showing the connections at that position

In this system the generator and motor actions are combined in a single machine.

In some of the earlier forms of Delco equipment the battery was composed of twelve cells, which were connected in four groups of three cells each. These groups were connected in parallel while charging and in series for operating the starting motor by quite a complicated switch. These switches were mounted on the end of the battery box proper and alongside an ampere-hour meter.

S. S. E. PLANT ABOUT READY

Philadelphia, Pa., May 4—The plant of the S. S. E. Co., Philadelphia, is completed and will soon be in readiness to make \$5,000 chassis. Victor Lee Emerson, president of the company, states that although nothing will be turned out for three months, the plant is sold ahead for one year.

The Junior Racing Car

(Continued from page 37)

two pieces of strap iron and an iron carriage bolt.

The axles should be placed in the center of the springs; that is, equi-distant from the front and rear ends. This will provide an equal action on the spring and will lessen the chance of a break as well as giving better action.

Axles are the next thing to be considered. The front axle is far more important than the rear.

There are several designs for front axle construction, but only the most practical will be considered here. The most desirable, of course, is of drop-forged Vanadium steel, but the construction of this type necessitates much labor and is quite expensive. If this type is desired, I would advise the builder to consult with a first-class machinist before attempting work on it. The cast-steel axle is very desirable, but here again expense enters into the situation, as it is necessary that patterns be made and neither of the above types, to the best of my knowledge, can be secured from manufacturers. The simplest design is illustrated here.

Two pieces of $\frac{3}{8}$ - by 1 $\frac{1}{2}$ -in. strap iron are secured. They are bent, as is shown in Fig. C, No. 1, to form a yoke for the reception of the steering-knuckles. A piece of 1 $\frac{1}{2}$ - by 2-in. ash is placed between the two pieces of iron and bolted securely, No. 2, Fig. C. It is necessary to see that small blocks are placed between the strap iron pieces on the outside of the frame members to give them support in the vicinity of the king-bolt holes for the steering-spindle, No. 3. Two holes, one on either end, are bored through both pieces of strap iron for the steering-spindle, the bottom holes $\frac{1}{8}$ -in. closer to the frame than the top holes, No. 4. This will give the wheels a dish which will make the car easier to handle. This makes the ideal, inexpensive front axle for the light car and one that any youth can build.

(Concluded next week)

Alcohol from Sawdust

Canadian Process for Production of Motor Fuel Is Reported

New Method Would Utilize Wood Waste From Forests

MADISON, Wis., May 4—According to reports here, there has been developed in Canada a process for the production of alcohol for motor fuel from sawdust which gives much promise. The report states:

"An enormous supply of wood waste is available in the great valleys of the Willow, Nechako, Bulkley and Skeena rivers in Central British Columbia, where the forests have been giving way to agriculture in part, but where there is still a limitless supply of big timber. This territory has recently been opened up by the new transcontinental Grand Trunk Pacific, and it is on woods taken from this region that the experiments for the production of alcohol have been carried on. The wood waste is broken down by distillation, and the wood alcohol produced converted by simple processes into true grain alcohol.

"Although the calorific power of alcohol is little more than one-half that of gasoline, its greater efficiency—alcohol, 28 per cent; gasoline, 16 per cent—compensates for this. This higher efficiency of alcohol is due to various causes, chief among which are the following:

"1—The volume of air required for complete combustion of alcohol is only about one-third that required by gasoline, and thus much less energy goes away in the exhaust. Moreover, this small dilution with air enables a more perfect mixture to be formed with consequent more perfect combustion.

200-lb. Pressure

"2—The alcohol-air mixture can be safely subjected to pressures of 200-lb. per square inch without spontaneous ignition, whereas the safety limit for gasoline is 80 lb. per square inch.

"3—All mixtures of alcohol and air containing from 4 to 13.6 per cent of alcohol are explosive, whereas the explosive range for gasoline is from 2 to 5 per cent, necessitating much more careful carbureter adjustment.

"4—The combustion products of alcohol are smokeless, almost odorless, and do not clog up the cylinders and valves.

"The only serious difficulty encountered would be the starting of the engine in cold weather, and this could be provided for by carrying a small auxiliary gasoline tank to be used in starting.

"Of all the possible sources, the most interesting, owing to the low cost of raw material, is the waste from the lumber industry, particularly that in the form of sawdust or small chips. This material in the vicinity of sawmills or woodworking plants

is often an item of loss, owing to its production in excess of their own power requirements, its value never rising above 50 cents a ton, even when used as a source of power. The disposal of this superfluous waste costs from 30 to 66 cents a cord of 1800 lb.

"From experiments which have been carefully conducted by various experimenters a ton of dry sawdust has been found to yield with proper treatment about 20 to 25 gal. of 95 per cent alcohol—ethyl or grain alcohol, not wood alcohol, for this latter is useless for fuel purposes, owing to the formation of products of combustion which would wreck the cylinders—and we could have, therefore, an estimated production from this source alone of around 500,000,000 gal. annually."

NEW STUDEBAKER PLANT

Saginaw, Mich., May 5—The Studebaker Corp. of America will erect a large assembling plant at Saginaw and will employ 700 men here. This plant is to be established in an effort to overcome transportation difficulties arising from freight car shortage.

STECKELS SELLS INTERESTS

New York, May 4—E. H. Steckels, president of the Holt-Welles Co., Inc., sole distributor for the Branford carburetor, has resigned and has sold his interests to the Malleable Iron Fittings Co., Branford, Conn. Mr. Steckels will enter business again as a manufacturers' distributor.

MAXWELL HAS RECORD SALES

New York, May 4—Sales of the Maxwell Motor Co. for the first three months of this year were more than 58 per cent larger than for the corresponding period last year. The total for the quarter was 19,000 cars against 12,032 cars in the first quarter of 1916. Indications are that after the usual dividends of \$3,000,000 and a possible Government tax of between \$500,000 and \$600,000 almost \$2,000,000 will be carried to surplus account.

EVINRUDE BUYS SITE

Milwaukee, Wis., May 4—The Evinrude Motor Co., Milwaukee, Wis., has purchased a 10-acre tract of land as a site for its new plant, to cost about \$250,000 complete. The Evinrude company will engage in the manufacture of a line of internal combustion engines for farm and general utility purposes, these being designed to use kerosene and the heavier distillates of petroleum as fuel but will continue to make rowboat motors. The present plant will be abandoned on the completion of the new works. Contracts will be awarded about May 28 for the erection of the new group, the main buildings of which will be a machine shop, 300 by 300 ft., and a gray iron foundry, 80 by 200 ft. A brass foundry unit also will be provided.



From the Woman's Viewpoint



Mobilization of American Women

How Those Who Drive Can Help Strengthen the Red Cross Army

IF the country is to make full use of its resources, no way will be more direct than the mobilization of women. Foreign example shows the wisdom of this.

Mobilization of men for an army means that some means must be invented to fill their places in the industrial world, motor and elsekind. In Great Britain, in France, in Italy, in Germany and in the smaller warring nations the women have become an important factor in the industrial world, especially in transportation and munitions. While it is to be earnestly hoped that the many vacancies explained by the bulletin issued after action on the field will not exist to such an alarming extent, there will be vacancies before ever the field of action is reached. An army must drill.

Industrial mobilization is even more than this, however. Careful fostering of the reserve energy and usefulness in the country's women is included. The women of the country as a whole are capable of industrial usefulness, as witness the recent report of the Government that more than 29,000,000 women sixteen years old and more were engaged in gainful occupations as were seven years ago.

Munitions Work in England.

Great Britain is employing 1,071,000 women in the places of men. In industrial work proper are 376 women to every 1000 workers. What has been learned from England alone about the usefulness of women in war times proves the advantages of a possible American mobilization of women.

"Thus far the munition work is the most important actual contribution made by women here," writes Norman Hapgood from London. "Women working for 5½ hrs. a day are turning out two-thirds as much as men are producing in 11 hrs. a day. I saw at work in a factory in Belfast one young woman who was producing 50 per cent more than the fastest man in the factory. I asked what her occupation was before the war began. 'Oh, I don't know,' said the partner who was showing me 'round. 'I imagine she was just a gentlewoman at large.'

"Nearly all these women went into the work partly out of patriotism. Some are the daughters of wealthy parents. Others come from families that are well to do but glad of the additional income. In only a few cases is the money earned necessary for the family support. These girls, therefore, have more enthusiasm, better general training and better nourishment than the average working girl."

The women of America are ready for mobilization. In fact, they are going ahead

along that line themselves. Their influence in these early days of the war has been felt in recruiting and in Red Cross work. It will be felt even more in the days to come, when the war will be more of a business and less of a novelty.

One way in which women can be mobilized is in Red Cross work, and this includes more than ambulance work for car drivers. Chicago has only 44,516 members of the Red Cross, this including men and women. New York has but 125,000, a small number in view of the possibilities. All the United States has just 350,000. Japan, with half the population, has 2,000,000.

Chicago has a drive on now to increase its membership. The goal was set at 150,000, but its most active workers are aiming higher than that even. The whole country should mobilize, and the women, most of all, in Red Cross organization. Here is a chance for the woman who gets about more easily and often than others of her friends through the freedom possessed in owning and driving a car to spread the gospel of mobilization for Red Cross and industrial causes. The nation is in the world war. It is up to that nation through its people to make that entry effective, and if the woman driver can help make it so, then there is that much more to her credit



French women drive cars, ambulances and even trucks and trams. This is a woman at Versailles

as a driver. The efficient car driver will be the driver who helps strengthen the nation, whether it is in dispatch-carrying, ambulance operating or a more subtle method, such as mobilizing the industrial and humanitarian resources.

Tennessee's Women Do Their Road Bit

THE women of Tennessee, the Volunteer State, are joining first aid classes, but they are doing other work that may prove of as great value to the country.

They have turned road-builders.

The women of Tennessee have been prominent in promoting the highways that lead through their state always, but lately the prominence has taken to itself a state-wide form. Three organizations have been formed recently. The first was at Knoxville in March, the second at Monteagle and the third at Chattanooga.

All this region is historical as a result of other war. It is a great gathering ground for motor tourists for this reason. Monteagle is the home of the summer chautauqua of the south with the University of the South not far away, at Suwanee. It is the half-way point, if a cloud point can be such, between Chattanooga and Nashville. Plans have been suggested to construct roads to Tracy City, the Swiss colony and the Wonder Cave. The organization held a meeting appropriate of the surroundings after its initiation, when its members gathered at the top of the mountain overlooking Battle creek.

Stock Threatens Work

Chattanooga has its Lookout mountain, and Lookout mountain has its Chattanooga. Incidentally, the two are the historical grounds of past weighty battles. Nevertheless, in spite of the dignity such possession gives, the first time the members of the Chattanooga association met they had to consider ways and means of confining the stock of the countryside so that the roads could be beautified with trees and flowers. A committee later appeared before the court to ask for protection in this respect, but action was postponed until the July term. Not only are the roads of that section of the state to be beautified, but information of value to the motorist is to be made available, so that data on suitable stopping places can be obtained readily by the traveler.

Knoxville was the pioneer—by a short period at least. Its members held a plant-

ing day April 7, and a stretch was planted in dogwood and other native trees. The stretch is half a mile east of Ten Mile creek, where the last Indian massacre in Eastern Tennessee took place. Twenty students from the Agricultural Extension Division of the University of Tennessee and Boy Scouts assisted.

Motoring Fashions According to Patria

MRS. VERNON CASTLE, since acquiring her dancing fame, has acquired that of being, according to her advertisers, at least, the best-dressed woman in America. This no doubt explains part of her success in *Patria*, the moving picture serial. For Mrs. Castle wears seventy-five different costumes during the play, and as the motor car figures largely in the film some of these costumes are for motorists.

The photograph shows her in one of the motoring costumes.

The coat is of knitted silk with a scarf of brushed Angora. The hat is similar to that worn by football quarterbacks. This hat in particular is well adapted for the woman who drives her own car at the speed which exhilarates. The entire costume is one of the many new models which will be in the sports wardrobe this season.

The Used Car Show As An Opportunity

THE national motor show for style; the used car show for utility. That is the motto of many who visit the show at which the motor car is headliner. Chicago is holding a used car show this week; Milwaukee held one week before last. At each the car which had proved its mettle in actual service was visited by purchasers rather than by those who wished to look around and see what different colors, lines and materials were being used this year.

The used car show should prove a great opportunity to women who buy their own cars especially. The dealers have done everything to safeguard the purchaser from any of the ills that owners of used cars are subject to, and the result is that even the novice should be able to pick a serviceable machine.

As a rule the woman is more apt to pick a good car than she would be if she weren't a woman. Blame it on instinct if you will, but the woman's natural dislike to a noisy engine and squeaky movement of a car protect her against any great indiscretions in buying, if she be not over-persuaded by the zealous salesman, which will happen in the best of families.

But the used car show offers a different opportunity. None of the large shows, you know, puts its cars through running exhibition in the place of display, though in the national shows, especially, the salesman on duty may give the interested visitor an



Mrs. Vernon Castle as she appears in *Patria* and the motoring costume described

appointment for an outside exhibition. The used car is the same in this respect. Nevertheless, there is a guarantee of efficiency. The national motor show for style gives this guarantee in the makers' reputation for good workmanship. The used car show, naturally, cannot offer this guarantee, because the maker can no longer stand sponsor for a car the treatment of which he cannot guarantee. The dealers themselves undertake to give guarantee in the used car exhibition. They do it this way.

Every car shown at Milwaukee first underwent a thorough mechanical inspection. Each was required to bear the inspection committee's tag before going on exhibition. All cars also bore a tag showing the name, model, year, engine number and the resale price. The salesmen used a uniform order blank in sales. This was a conditional sales contract which gave the purchaser the option of returning the car within seven days if it did not prove satisfactory.

Chicago is requiring a like inspection. It is estimated that 700 used cars will be exhibited for sale during the course of the nine-day show. Each car is tagged with tickets that give the purchaser advance information on what he may expect in the way of performance from the car. The method carries a guarantee such as the new car carries, for given a car mechanically fit, no matter whether it is new or used a year or so, the buyer feels reasonably certain that the behavior of that car when bought will be bad through the fortunes of driving and not through misrepresentation at the time of purchase.

What has this to do with the woman who wants to buy a car and would like to get the less expensive car to begin with? It has a good deal to do with it. In the first place she has an unusual opportunity such as she has at the national show in that the dealer finds himself in spontaneous competition with so many others that she can really learn something about the mechanical nature of the car. Also, she sees at once the attractiveness, the utility and the reliability of

used cars put on exhibition by responsible dealers who explain the condition of the cars sold.

The used car show is the family show in a way. That is one reason that might be held to justify the holding of it on Sunday in case any serious objection were made. On that day the husband and wife of the family can attend the show together, with the children along perhaps, all to have a voice in the deciding of whether it wouldn't be possible to buy a car when by getting one that had been used one could get it in excellent mechanical condition at a price beside which that of a new car of the same make would be prohibitive.

This One Manages a New York Garage

MRS. M. L. GORDON is manager of the Onondago Garage at Syracuse, N. Y. The company sells Liberty cars, and Mrs. Gordon is one of the reasons why it sells them. When asked for some of her experiences as garage manager Mrs. Gordon will tell you that the garage handles the cars of 6000 tourists every summer and let you fill in the details.

She advises other women who want a business career with a lot of wholesome fun thrown in to go and do likewise.

"When the garage was built we threw away the key," says Mrs. Gordon, speaking of the readiness of the force to do business at any hour. "And as a number of tourists have remarked, they always find me on the job to pour oil on troubled waters."

"In the garages, beside handling all kinds of repairing we have a paint shop where we do first class work."

"The selling of cars is a new undertaking for me. It is a most thrilling experience. As a mental stimulant it has it all over knitting and dish-washing. I am enjoying it immensely for I do love a fight. As you know, with the competition in the field these days, it is up to me to put on the gloves and go to it."



Routes and Touring Information



Chillicothe, Mo.—Elkhart, Ind.

CHILLICOTHE, Mo.—Editor *MOTOR AGE*—Give best routing from here to Elkhart, Ind., so as to include the large cities en route.—Leo Hirsh.

From Chillicothe proceed to Frankfort, Austin, Xenia, Dayton, Eaton, Richmond, Ind., Centerville, Germantown, Dunreith, Greenfield, Indianapolis, Royalton, Lebanon, Mechanicsburg, Antioch, Frankfort, Lafayette, Montmorenci, Wolcott, Remington, Thayer, Crown Point, Schererville, Highland, Calumet, East Chicago, South Chicago, Chicago, East Chicago South Chicago, Calumet, Gary, Miller, East Gary, Porter, Michigan City, New Carlisle, South Bend, Mishawaka, to Elkhart.

Vol. 4 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip.

Chicago, Ill.—Ashland, Wis.

Elkhart, Ind.—Editor *MOTOR AGE*—Give me the best and direct route from Chicago to Ashland, Wis.—P. M. Cochran.

From Chicago proceed to Maywood, Addison, Ontarioville, Elgin, Coral, Harmony, Marengo, Garden Prairie, Belvidere, Rockford, Beloit, Wis., Janesville, Edgerton, Stoughton, McFarland, Madison, Waunakee, Dane, Lodi, Okeo, Merrimac, Baraboo, Plainville, Quincy, Holmsville, New Rome, Grand Rapids, Plover, Stevens Point, Mosinee, Rothschild, Wausau, Medford, Chelsea, Westboro, Ogema, Phillips, Ffield, Park Falls, Butternut, Glidden, Cayuga, Mellen, High Bridge, Marengo, Ashland.

Vol. 5 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip.

St. Louis, Mo.—Joplin, Mo.

St. Louis, Mo.—Editor *MOTOR AGE*—Give a route from here to Joplin direct, avoiding Kansas City.—Walter B. Yost.

From St. Louis proceed to Gray Summit, Union, Anaconda, Sullivan, Leasburg, Cuba, St. James, Rolla, Edgar Springs, Licking, Raymondville, Houston, Simmons, Cabool, Dunn, Mountain Grove, Norwood, Macomb, Mansfield, Diggins, Fordland, Rogersville, Galloway, Springfield, Republic, Billings, McKinley, Marionville, Aurora, Verona, Pierce City, Wentworth, Diamondville, Joplin.

Vol. 5 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip.

Boston, Mass.—Youngstown, Ohio

Athol, Mass.—Editor *MOTOR AGE*—Publish best route from here to Youngstown, Ohio, and approximate mileage.—George Mack.

From Boston proceed to Brookline, Auburndale, Wayland, Marlboro, Northboro, Worcester, Leicester, Brookfield, Warren, Palmer, N. Wilbraham, Springfield, Longmeadow, Thompsonville, S. Windsor, Hartford, Farmington, Plainville, Southington, Marion, Waterbury, Middlebury, Southbury, Sandy Hook, Newtown, Danbury, Pawling, Beekman, Noxon, Arlington, Poughkeepsie, Staatsburg, Rhinebeck, Red Hook, Livingston, Hudson, Stockton, Rensselaer, Albany, Schenectady, Amsterdam, Fort Johnson, Fonda, Little Falls, Herkimer, Ilion,

Frankfort, Utica, Vernon, Wampsville, Canastota, Manlius, Center, Syracuse, Camillus, Auburn, Seneca Falls, Waterloo, Canandaigua, Lima, Avon, Batavia, Buffalo, Evans, Brant, Irving, Silver Creek, Fredonia, Portland, Westfield, Ripley, North East, Pa., Harbour Creek, Erie, Girard, Conneaut, Ash-tabula, Geneva, Unionville, Painesville, Willoughby, Cleveland, Chagrin Falls, Welshfield, Southington, Warren, Youngstown. This routing approximates 875 miles.

Vols. 2, 1 and 4 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contain complete running directions for this trip.

Decatur, Ill.—Chattanooga, Tenn.

Mayfield, Ky.—Editor *MOTOR AGE*—Furnish routing from Decatur, Ill., to Chattanooga, Tenn.—Erle B. Besley.

From Decatur proceed to Assumption, Pana, Oconee, Ramsey, Vera, Vandalia, Bluff City, Augsburg, Salem, Dix, Mount Vernon, Bonnie, Ina, Benton, Frankfort, Johnston City, Marion, Willeford, Ozark, Gannettown, Round Knob, Metropolis, Maxon Mill, Ky., Paducah, Briensburg, Eggners Ferry, Cadiz, Hopkinsville, Clarksville, Adams, Cedar Hill, Springfield, Nashville, Tenn., LaVergne, Murfreesboro, Beechgrove, Manchester, Hillsboro, Pelham, Wonder Cave, Monteagle, Tracy City, Jasper, Rankins Ferry, Wauhatchie, Chattanooga.

Vols. 5 and 6 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contain complete running directions for this trip.

Dubuque, Iowa—Denver, Colo.

Freeport, Ill.—Give best route from Dubuque to Minneapolis and then to the Black Hills on to Denver.—James O'May.

Do not plan on going through the Black Hills as it is not advisable. We suggest the following route: From Dubuque, Iowa, go to Farley, Dyersville, McGregor, Prairie du Chien, Mount Sterling, Liberty Pole, Viroqua, Portland, LaCrosse, LaCrescent, Ridgeway, Witoka, Winona, Lewiston, St. Charles, Chester, Rochester, Pine Island, Zumbrota, Hader, Cannon Falls, St. Paul, Minneapolis, Excelsior, Victoria, Waconia, Young America, Norwood, Glencoe, Sumter, Brownston, Stewart, Buffalo Lake, Hector, Bird Island, Olivia, Montevideo, Milan, Appleton, Ortonville, Big Stone City, Millbank, Altamont, Clear Lake, Brookings, S. D., Dell Rapids, Sioux Falls, Canton, Beloit, Fairview, Hudson, Hawarden, Akron, Westfield, Sioux City, Homer, Winnebago, Oakland, Craig, Tekamah, Blair, Omaha, Elkhorn, Waterloo, Valley, Fremont, Ames, North Bend, Schuyler, Richland, Columbus, Duncan, Central City, Grand Island, Wood River, Shelton, Gibbon, Kearney, Odessa, Overton, Lexington, Cozad, Gothenburg, North Platte, Sutherland, Paxton, Ogallala, Brule, Big Springs, Chappell, Lodgepole, Sunol, Sidney, Potter, Dix, Kimball, Bushnell, Neb., Pinebluff, Wyo., Egbert, Cheyenne, Fort Collins, Loveland, Berthoud, Longmont, Denver.

Vol. 5 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contains complete running directions for this trip.

Cleveland, Ohio—Ogunquit, Me.

Bloomington, Ind.—Editor *MOTOR AGE*—Give best route from Cleveland, Ohio, to Ogunquit, Me., by Buffalo, Albany and Boston; also give

distances from each place named.—J. D. Showers.

From Cleveland, Ohio, go to Willoughby, Painesville, Unionville, Geneva, Ashtabula, East Village, Conneaut, Girard, Erie, Harbour Creek, Moorheadville, North East, Pa., Ripley, N. Y., Westfield, Portland, Brocton, Fredonia, Sheridan, Silver Creek, Irving, Farnham, Buffalo, Caledonia, Avon, Canandaigua, Geneva, Seneca Falls, Auburn, Sennett, Camillus, Syracuse, Manlius Center, Mycenae, Utica, Frankfort, Mohawk, Herkimer, Little Falls, St. Johnsville, Nelliston, Palatine Bridge, Fonda, Tribes Hills, Amsterdam, Scotia, Shenectady, Albany, Rensselaer, E. Greenbush, Nassau, West Lebanon, New Lebanon Center, New Lebanon, Shaker Village, Mass., Pittsfield, Lenox, Lee, Bonnyrigg, Chester, Huntington, Russell, Westfield, W. Springfield, Springfield, N. Wilbraham, Warren, Brookfield, Spencer, Leicester, Worcester, Shrewsbury, Northboro, Marlboro, So. Sudbury, Weston, Auburndale, Newton, Boston, Cambridgeport, Medford, Everett, Revere Beach, Lynn, Swampscott, Salem, Beverly, N. Beverly, Wenham, Hamilton, Ipswich, Rowley, Newbury Old Town, Newburyport, Salesbury, Smithtown, N. H., Hampton Falls, Hampton, Portsmouth, Kittery, Me., York Corners, York Village, York Harbor, York Beach, Ogunquit.

Vols. 1 and 2 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contain complete running directions for this trip.

Flint, Mich.—Gaffney, S. C.

Gaffney, S. C.—Editor *MOTOR AGE*—Give best route from Flint, Mich., to Gaffney, S. C.—B. L. Hames.

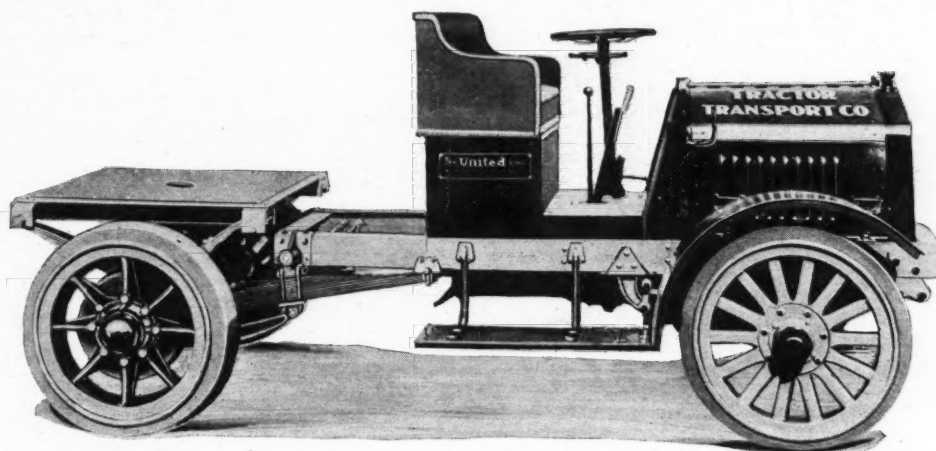
From Flint, proceed to Fenton, Hartland, Brighton, Ann Arbor, Saline, Milan, Dundee, Ida, Temperance, Toledo, Stony Ridge, Lemoyne, Woodville, Fremont, Clyde, Bellevue, Norwalk, Townsend, Oberlin, Elyria, N. Ridgeville, Dover, Cleveland, Brecksville, Richfield, Ghent, Akron, Uniontown, Greentown, New Berlin, Canton, Massillon, Navarre, Justus, Beach City, Strasburg, New Philadelphia, Midvale, Ulrichsville, Dennison, Laceyville, Cadiz, Georgetown, Pleasant Grove, Colerain, Bridgeport, Wheeling, W. Va., Elm Grove, Claysville, Washington, Scenery Hill, Beallsville, W. Brownsville, Brownsville, Uniontown, Hopwood, Farmington, Somersfield, Addison, Keyzers Ridge, Grantsville, Frostburg, Cumberland, Hancock, Clear Spring, Hagerstown, Williamsport, Falling Water, Martinsburg, W. Va., Darkesville, Bunker Hill, Winchester, Middletown, Strasburg, Toms Brook, Maurertown, Woodstock, Edinburg, Mount Jackson, Lacey Springs, Harrisonburg, Mount Crawford, Burkettown, Mount Sidney, Rolla, Staunton, Greenville, Midway, Fairfield, Timber Ridge, Lexington, Fancy Hill, Natural Bridge, Buchanan, Troutville, Cloverdale, Roanoke, Rockymount, Martinsville, Ridgeway, Va., Price, N. C., Stoneville, Madison, Stokesdale, Kernersville, Winston-Salem, Hanes, Farmington, Mocksville, Statesville, Barlum Springs, Troutmans, Mooresville, Mount Mourne, Davidson, Cornelius, Huntersville, Croft, Charlotte, Belmont, Gastonia, Kings Mountain, Grover, Blacksburg, S. C., Gaffney.

Vols. 4 and 6 of the Automobile Blue Book, published by the Automobile Blue Book Pub. Co., 910 S. Michigan Ave., Chicago, contain complete running directions for this trip.

Old National Pike

Delmont, Pa.—Editor *MOTOR AGE*—Is the old National Pike from Washington, Pa., to Columbus, Ohio, an improved highway?—H. N. Smith. This has been improved with the exception of 12 miles which are to be bricked this summer.

United Motors to Make Tractor



One of the 6-ton tractors to be produced by the United Motors Co. It will sell at \$2,490

TWO hundred 6-ton tractors per month is the proposed production schedule of the United Motors Co., Grand Rapids, Mich., and with this in view a 60 by 400-ft. addition is being built to the plant, which will be used exclusively for assembly of the tractor. The selling price of the machine will be \$2,490, and it is designed to be applicable to a wide variety of uses. The patented suspension, under Marshall patents held by the Knox Motor Co., is licensed for. It has a spring supported rocking-trailer platform which carries 40 per cent of the carrying or pay-load under normal circumstances.

In this suspension cantilevers are anchored to the frame, and on the under side of the springs where these cantilevers are fastened are brackets. The radius arms are fastened to these brackets by heavy pins. These arms extend to the rear and are bolted to the under side of the trailer platform spring seats. These, in turn, are fastened to a solid or dead axle.

Trailer Platform

The trailer platform of the rocking fifth wheel principle is comprised of a heavy angle-iron frame, massively reinforced and covered with boiler plate on its upper surface. This construction allows of the use of any diameter circle on the upper carrier, and for this reason vehicles originally designed for horse drawing can be built over readily for drawing by the tractor. The hole for the king bolt is in the center of the plate, and beneath this plate there are provisions to take the thrust of the pin and to insert the locking device which prevents slipping out of the pin while the tractor is in use.

The internal-gear type of rear axle is used, it being a Torbenson. The solid, or load-carrying, axle is carried on roller bearings at its outer ends. The rear is fitted with steel wheels, equipped with 34 by 7 solid-rubber tires. The internal gear drive mechanism and brake drums are bolted to these wheels.

A Buda truck engine is used. It is the L-head $4\frac{1}{4}$ by $5\frac{1}{2}$ -in. engine with three-bearing crankshaft, splash pressure lubrication and centrifugal pump cooling. Ignition is by Bosch magneto. Behind is a four-speed gearbox with nickel steel gears and splined shafts, all mounted on ball bearings. Drive is through a propeller shaft of seamless tubing through two universals.

BANTA TO DETROIT AGENCY

Detroit, May 5—J. B. Banta has been appointed supervisor of sales for the Smith Motor Co., Locomobile and Stutz dealer here. Mr. Banta has served with the Locomobile company for nine years and was formerly the company's representative in Chicago.

5000 MOTO-METERS DAILY

Long Island City, N. Y., May 4—The Moto-Meter Co., Inc., manufacturer of the Boyce Motor-Meter, announces that orders received by them during the last three months exceed the entire shipments of 1916. New equipment is being installed in the factory, and a daily production of 5000 Boyce Motor-Meters soon will be reached and maintained, so that all requirements can be met promptly.

HAS DOUBLY ROTATING ENGINE

Chicago, May 5—An aviation engine in which the cylinders and the crankshaft both are permitted to rotate has been developed in Chicago and the design is such that, it is understood, it has aroused interest in governmental circles. It is known as the Muffley engine and at present is designed for ten cylinders approximately $4\frac{1}{2}$ by $5\frac{1}{8}$ in. in size and is expected to weigh only $1\frac{1}{4}$ lbs. per horsepower developed. The engine as a whole is similar to the present rotating cylinder engines, such as the Gnome, except that not only do the cylinders rotate, but the crankshaft rotates in the opposite direction, each at a speed of approximately 1200 r. p. m. The rela-

Two Hundred 6-Ton Models Each Month

tive speed therefore is 2400 r. p. m. The valve action is almost the same as that used on the old Adams-Farwell engine, Glen Muffley, the designer of the new engine, having been instrumental in the design of the earlier engine.

For aviation work two propellers are to be used, one operated by the crankshaft direct and the other by the cylinders direct, the propellers being one behind the other and rotating in opposite directions. Muffley's test shows that with two propellers operating in opposite directions and one immediately behind the other there is practically no interference in air current. In fact, the efficiency, he says, is higher than that of two propellers side by side and very much higher than that of a single propeller. The use of two oppositely rotating propellers in this way is not new, as Captain Baldwin employed this arrangement many years ago in one of his dirigibles. The double rotation of the engine, however, is new, and one good effect is that gyroscopic is almost entirely eliminated. Muffley is the moving spirit in the Muffley Motors Co., Chicago.

NEW DOUBLE DRIVE TRUCK

Clintonville, Wis., May 5—William A. Besserdich, one of the founders of the Four-Wheel-Drive Automobile Co., Clintonville, Wis., maker of the F-W-D truck, has organized the Wisconsin Duplex Auto Co. of Clintonville with a capital stock of \$500,000 to manufacture a new type of double-drive utility car. It is said the new product will be a light delivery type, which will be made in large quantities and sold at a comparatively low price. The maximum capacity probably will be kept at 1 ton. It is also said that plans of the new company contemplate the issue of a passenger car type.

Fifty per cent of the stock in the new concern already has been subscribed for and a permanent organization has been effected by the election of the following officers: President and chief engineer, William A. Besserdich; vice-president, A. S. Larson; secretary and manager, B. A. Mosling; treasurer, J. P. Mosling; directors, the officers and J. H. Frank. A factory will be established as soon as possible.

PACKARD WORKERS AID RED CROSS

Detroit, May 5—More than 75 per cent of the 9000 employees of the Packard Motor Car Co. contributed \$8,824 to the fund of the Detroit Chapter of the Red Cross. This is the largest single contribution received by the Detroit chapter.



The Readers' Clearing House



CAMPING OUT A LA PULLMAN CAR Recounts Pleasure of Touring Through Florida in Ford

MARTINSVILLE, Va.—Editor MOTOR AGE—My wife and I spent the winter in Florida, driving from western Virginia in a Ford touring car. We patronized the hotels on the way down, but a short while after reaching St. Augustine, Fla., we made the acquaintance of some very pleasant people who had camped all the way from Michigan and Illinois. One family had a Ford sedan and Shattock trailer, making a convenient, comfortable home on wheels. The others had arranged their Ford touring car to sleep in by lowering the back of the front seat so a comfortable bed could be made up in the car. They also had a small tent to cook and eat in. The better class of hotels in Florida are crowded during the winter and their rates are excessive. Unless you make reservations in advance, you are often compelled to sleep on a cot or sofa in the hall paying from \$2 to \$4 for the privilege of stopping at the big hotels. Or else you are told they are full and they cannot make room for you. The freedom of camping does away with the formalities of hotels, or high prices.

How to Fix the Car

Home cooking with just what we like, served to please ourselves, appealed to us, so we proceeded to fix our car a la Pullman. We bought a small 7 by 9 tent and fly to put over the car and reach over the passage way between the tent and side of the car. A two-burner wickless oil stove, folding table, cupboard, or grub box, a few stools, with necessary cooking utensils, and joined the happy party. We traveled together over two months, and lived better and cheaper than we could any other way. Even during the freeze, which extended 45 miles below Miami, we were much more comfortable than tourists who had rooms in the hotels, as there are very few hotels or homes so far south having heating arrangements in the buildings.

The advantages of such a way of seeing the country are numerous. After locating in some town on a convenient vacant lot we wanted to see the adjoining country and places of interest. Just put the traps out of the car into the little tent and tie the flaps, get in the car, and drive all day among the orange and grapefruit groves, or go to the beach and play, swim or fish. Arriving back to the camp, it only took a few moments to arrange the Ford Pullman berth, the wife preparing supper the while. Then as soon as dishes were washed and fish or oysters fixed, all the campers would gather about a camp fire and recount the day's doings. Often all



Fig. 1—Eddie Pullen in the Mercer which he drove during the 1916 racing season

joined in song or such amusements as added to the general entertainment. Sometimes we went to see the shows in town. Often the neighbor residents would call and spend the evening about the camp fire, seeming to enjoy it as much as we did. When bedtime came, we stepped into the tent, disrobed and got into the Ford Pullman which was as comfortable as anyone could wish for. A great many fixed their cars while in Florida this winter and another year will see thousands of families doing their traveling that way, camping out, seeing more, free from hotel and garage bills and formalities, and far healthier. We had families camping with us who were financially able to stop at the best hotels doing just as we did and enjoying it to the fullest extent.—George W. Griffith.

Ammeter on Model 5 Dort

Grand Mound, Iowa—Editor MOTOR AGE—Publish a diagram showing how to attach an ammeter on a Model 5 Dort car, and if it needs additional fuses, show where to put them. This car uses the Westinghouse system.—Fred Weiss.

The diagram you ask for is published

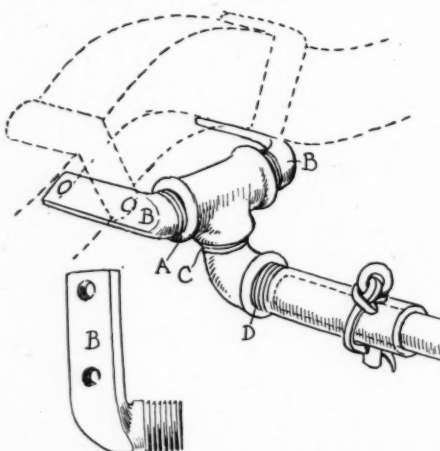


Fig. 2—Diagram illustrating easily constructed trailer hitch for use with a Ford car. Ordinary pipe fittings figure in the makeup of this device

in Fig. 4. You will note that one terminal of the ammeter is connected to the negative pole of the starter switch. This means that the starter current does not pass through the ammeter. The other ammeter terminal connects with one wire to the switch and another wire to the cutout.

LET THE ENGINE STEER THE CAR Reader Thinks Designers Are Behind Time in This Feature

Rockford, Ill.—Editor MOTOR AGE—Why must we steer the car by hand? It is a hard grind to twist and turn even for one little hour. Moreover, what is the engine for if not to be utilized to the utmost? Long ago the steam road rollers used a power worm-gear to warp the heavy affair hither and yon. But in a pleasure rig, we are such non-inventive and custom-ruled beings continuing to drive as primitively as Patrick admitted he played the fiddle—by main strength. Away with violence and wrenchings—let's direct the biggest and swiftest with a tiny lever. Ah! to be truly aristocratic how one could loll back wholly at ease, and with one good eye cocked ahead, let the other rove far afield, one idle arm luxuriously reposing along the back of the nether seat, the contents of which do not enter into the technic of this article on mechanics pure and simple. Let the engine do the work!—Verne Cole.

EASILY-MADE HITCH FOR TRAILER Pipe Fittings Used to Fasten Draw Bar to Ford

Vermilion, S. D.—Editor MOTOR AGE—Suggest construction of a trailer hitch suitable for attaching a trailer to a Ford.—W. H. Beede.

Here is a trailer hitch, Fig. 2, for Ford cars which is noiseless, universal in action and very simple and inexpensive to make. The only difficult parts are the two brackets B-B which are made of 1½-in. round iron drawn out, flattened to fit on the un-

der side of the rear spring clips, bent to the proper angle and threaded. They should both screw into the 1-in. malleable tee and after being bolted to the frame, be free from any considerable binding. This will require a nicety of fit which will demand careful measurements, bending and drilling.

All the threads on the tee and street L should be tapped out slightly so that they will be not too tight giving free motion. The male threads should all be long. The joint at A will allow the trailer an up and down motion; that at C will permit turning and that at D the twisting motion caused by one wheel raising. The short piece of 1-in. pipe making the joint D makes a receptacle for the tongue of $\frac{3}{4}$ -in. pipe or 1-in. round iron. Any other rigid coupling scheme might be welded or otherwise fitted to this pipe.

When not in use unscrew at C after detaching the tongue.

Another method, Fig 3, would call for the use of a lathe and a brass casting.

Turn a perfectly spherical ball on the end of a bracket as shown and on the inside of the brass casting E make a socket that will exactly fit the ball and extend one-fourth to one-third the diameter beyond the largest diameter of the ball.

After fitting the ball perfectly and seeing that the movement is free in every direction, take a small hammer or a plumber's calling tool and with light blows gradually work the opening smaller around the base of the ball until the ball cannot be removed.

When this device is not in use, lash the free end to the spring with a short strap.

VALUE OF A PUMP IN A GARAGE

Some Information On Storing Space and Wash Racks

Louisville, Ky.—Editor MOTOR AGE—I have a lot 82 by 100 ft. in the middle of a block with a 60 ft. asphalt street in front and a 20 ft. alley in the rear, and wish to build a garage, showroom and repair shop on the first 100 ft. Would like your idea as to how I may use this space to the best advantage with a ramp to the second floor, or if an elevator could be used to better advantage. How much space is it customary to leave between cars? Is it satisfactory to wash

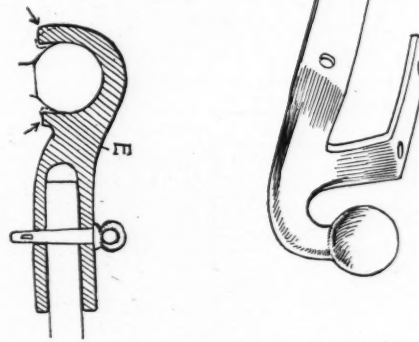


Fig. 3—A more expensive trailer hitch for use with Ford cars. It is designed to clamp under the clips of the rear spring

cars in their stalls? If so, how much space should be left between cars? What is the best way to light a garage and washstand? How many cars would this garage take care of? What firms design garages?—A. B. Thompson.

You cannot store more than forty cars in this garage, assuming that you allow a space 30 by 40 for your shop and a space at the front of the building about the same size, although possibly not the same dimensions for showroom, accessory store, etc.

A ramp is, generally speaking, more advisable than an elevator for a building of this size, but it is questionable whether it would not be better to build on the 200 ft. of the lot rather than put a two-story building on the front 100 ft. There are no disadvantages in using a ramp, except that it takes up space, and in a building of this size, it is often possible to work the ramp in such a way that it will not make very much difference in the number of cars that can be stored.

The space per car should be 7 ft. and this must be net. In other words, any space allowed for posts should be added to this. It is not satisfactory to wash cars in their stalls for a great many reasons. In the first place, the light is usually bad, in the second place, there is the danger of splashing adjoining cars, and finally, if this method were used, it would be necessary to

allow a prohibitive amount of space between each two cars.

If you object to having the usual wash-rack, you might follow the method used in the Hudson Garage in New York, in which there is a portable washer running on tracks up and down the aisle. When a car is to be washed it is simply pushed out into the aisle and the washer run over it. The washer is connected to a nearby pipe and curtains are put up, or rather dropped, to separate this car from adjoining cars, but there is a free view up and down the aisle, so that it is not necessary to use artificial light and so that better ventilation is obtained.

There is no concern which makes a specialty of designing garages.

No Ford Axles on Renault

Denver, Col.—Editor MOTOR AGE—I have a Renault chassis with four-cylinder $2\frac{1}{2}$ by $4\frac{1}{2}$ engine. This weighs 1150 lb. without front and rear axles and wheels. As these axles are not standard tread and are exceptionally heavy, for they weigh 475 lb. with wheels, I wish to replace them. I intend to rebuild this chassis and fit a couple of light seats as this engine in actual road work on the old chassis has turned about 2400 r.p.m.

1—I desire to fit a set of Ford axles to this chassis on account of their lightness and small upkeep expense. Is there any reason why this should not prove successful if properly done?

2—As these axles would carry semi-elliptic springs, would they need reinforcing, especially the housing on the rear axle except for a good heavy truss rod?

3—Would you consider them strong enough for this chassis?

4—Also would it be worth while to have the old valves reamed out and larger ones fitted. If so, how much larger can they be?—Clifford W. Kirkley.

1-2-3—Do not attempt to fit Ford axles to this chassis as they are far too light. The Ford axles are designed to be used with the Ford engine and chassis and will not stand up properly when used with a heavy car as you mention.

4—This depends on how much stock there is around the present valve openings. If you wish to use the engine for fast work, it may pay you to ream the valves to a larger diameter. You would probably be safe in reaming them $\frac{1}{4}$ in. over their present size.

Eddie Pullen's Mercer

South Bend, Ind.—Editor MOTOR AGE—What has become of the two Amplex cars entered at Indianapolis in 1911?

2—Has the Monroe M-4 touring car aluminum pistons or cast iron?

3—Illustrate the Mercer driven by Eddie Pullen last year.—Harold D. Crocker.

1—To the best of our knowledge they are not being raced any more and we do not know whether they are still in operating condition or have been scrapped.

2—Cast iron.

3—Shown in Fig. 1.

Rims to Use on Ford

St. Peter, Mont.—Editor MOTOR AGE—Which style of demountable rim do you recommend for the Ford car, the solid type or the kind that can be opened by releasing a lock on the inside of the rim; also which style tire, clincher or straight side, would you prefer for use on a demountable? The clincher type seems most used on the Ford.—Geo. T. Overose.

While both types of rim have their advantages, we believe you will be satisfied with the solid type. The fact that the rim is in one piece make for strength and the Ford tires are not so large but what

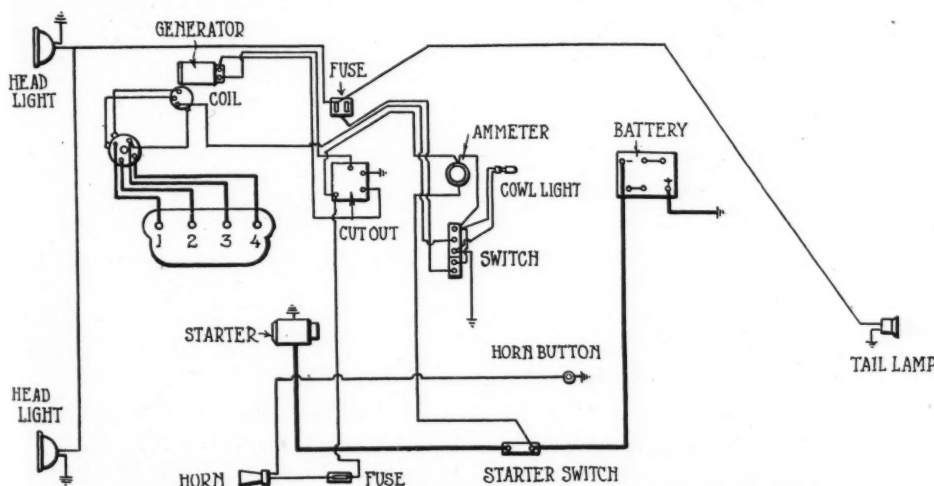


Fig. 4—Diagram showing how to attach ammeter to model 5 Dort car. One terminal is connected to the starter switch and the other to the switch by one wire and the cutout by another

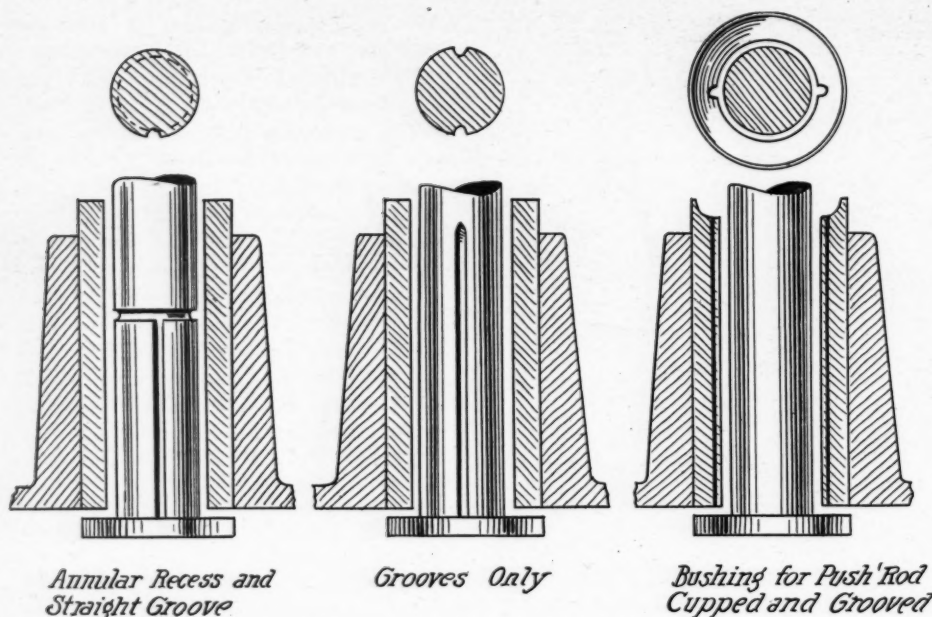


Fig. 5—Method of bushing push rod which has become a sloppy fit

they can be easily put on or taken off. We mean, of course, for you to use the clincher tires. The very fact that the clincher tire is used in the majority of cases on Fords fitted with demountable rims will carry out this fact. The one thing to look out for with demountable rims is to make sure that the rim wedges are drawn up tight, and that each wedge has the same tension. Otherwise the tire will not run straight, resulting in unnecessary wear.

HOW TO GET RACING CAR NOISE Low Rumble Can Be Produced by Special Muffler Described

Los Angeles, Cal.—Editor MOTOR AGE—I am overhauling a four-cylinder T-head National engine. The machine was a special roadster, quite speedy, but I am quite sure should be faster.

1—What means or method is used to bring out the low, distinct rumble in the exhaust of this engine, 5 in. bore by 5 11/16 in. stroke? We have leak tight rings, fine compression and timing perfect, enlarged exhaust pipe with no muffler, but still cannot get that harmonious racing-car sound.

I am shortening the wheelbase. How about a 108-in. wheelbase for this car?

2—What type of rear springs are used in general run of racing cars?

3—What size wire wheels are used generally on racing cars? I want a wheel to fit cord tires that are commonly carried in stock. What about tires 33 by 4 1/2 or 32 by 4 1/2? Of course clincher tires are the kind used. The former wheels were for tires 36 by 4 1/2.

4—How must the car be geared to attain the greatest possible speed?—Walter Young.

1—The low rumble in the exhaust of a racing car is due generally to the design and construction of the engine. As the engine you have is several years old, about the only thing you can do is to magnify the sound by the method shown in Fig. 6. This shows a large sheet steel cylinder A, fitted with a conical-shaped head into which the exhaust pipe is led as shown. The end of the exhaust pipe should be flared, as shown at B. The rear end of the cylinder A is covered with a metal cap into which several holes have been made. We have seen this arrangement used very successfully on a small high-speed engine, the exhaust of which sound-

ed like a high-powered racing car. Many of the racing cars give out a metallic sounding exhaust because the exhaust pipes and headers are made of thin metal. This thin metal will vibrate under the periodic exhaust impulses and set up a peculiar ring of its own. Of course, the thinner the exhaust pipe the better will be its radiating effect.

This wheelbase will be all right for track work.

2—Nearly all of the racing cars use semi-elliptic rear springs.

3—The majority of racing cars are fitted with 32 by 4 1/2 or 34 by 4 1/2-in. tires. These sizes are carried in stock.

4—The correct gear ratio can be found by trial only, that is if the car is to be used for racing. To begin with, you must know how fast your engine is capable of turning over, the size wheels you intend to use and the speed desired of the car. Scientifically-designed racing cars have appeared on tracks from time to time and after several try-outs they were found to have either too low or too high a gear ratio. So you can see the matter of correct gear ratio for the greatest speed is one of experiment. Another thing that must be considered in this case is whether the car is to be used on the road, or solely for track purposes.

Piston Pin Breakage

Washta, Iowa.—Editor MOTOR AGE—I purchased a 1913 model M. Chalmers "30" roadster and upon examining the engine, I found

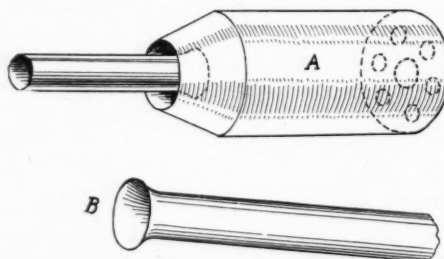


Fig. 6—Noise amplifying exhaust to give racer sound to small engines

piston pins broken in Nos. 2 and 4 cylinders. I had them replaced by a local repair man. I am overhauling it now and find the piston pin in No. 4 cylinder broken again. The bearings seem to be in perfect condition, and the car has not been driven over 2000 miles since replacing. What does Motor Age suggest is the trouble?—Clifford Law.

Inasmuch as this car is several years old, it may be that the piston pin guides are badly worn or that the new pins fit too closely and do not provide for proper lubrication. It may also be possible that the pistons in these cylinders have become worn to such an extent that they cause a side slap, resulting in breakage of the pins.

RESTA'S PEUGEOT IS FOR SALE

Cost \$22,000 to Build, Quoted Price of Owners \$10,000

Fort Morgan, Colo.—Editor MOTOR AGE—Illustrate the different ways in which noted racers hold their steering wheels while racing.

2—Is the new Emerson car being manufactured?

3—What is the bore and stroke used in this car?

4—What was the cost of Dario Resta's Peugeot racing car?

5—Is this car recognized as the fastest car in the world?

6—Where is this car offered for sale, and what is the price?—Frederic Belle.

1—In the group shown in Fig. 10 are photographs taken especially to show how the drivers whose names are given hold their steering wheels.

2—Yes.

3—3 3/4 by 4.

4—According to the Peugeot Auto Import Co., New York, it cost \$22,000 to build this car.

5—No. It is recognized as the fastest competition car with an engine in which the cubic inch piston displacement is less than 300. The Benz cars driven by Oldfield and the late Bob Burman, the Fiat driven by Duray, the Christie and several other cars with engines larger than 300 cu. in. piston displacement have been capable of greater speed. This recognition of the speed of Resta's Peugeot is based on its performance in competition and not on trials for speed records.

6—Peugeot Auto Import Co., 1800 Broadway, New York, by A. G. Kaufmann. The importers are willing to sell the car for \$10,000.

SPEED FROM ALTERED FORD CAR No Definite Estimate Possible—Judged from Others

Rusk, Texas.—Editor MOTOR AGE—I am rebuilding a Ford car according to these specifications: 1/8 in. shaved off of cylinder head to raise compression. Diameter of valve ports directly under valves reamed out about 1/8 in. oversize, leaving about 1/16 in. of valve seat, using regular stock valves. Cam shaft giving longer opening and higher valve lift as sold by D. R. Noonan of Paris, Ill. Iron pistons weighing 1 1/4 lbs. and perfectly balanced. Two double rings at top of piston. Atwater-Kent automatic-type ignition. Rayfield-Ford special carburetor 1 in. Extra large funnel on rear end of regular Ford oil pipe. Regular Ford wheels and tires; Racetype body, fairly streamline in shape, weight about 200 lbs. Three to 1 gear ratio at rear axle.

1—What speed should I expect to make with this on a straightaway?

2—In how many seconds should I accelerate to a speed of 40 m.p.h.?

3—Could I attain this speed quicker with regular stock gearing?

4—Which gear-ratio would be best for racing on a half-mile dirt track where turns are somewhat soft?

5—What were the principal causes of cars

falling to finish in the last big Ford races at Chicago?

6—How could these faults best be eliminated?
—Harry H. Bruner.

1—It is hard to say just what speed you might expect from an outfit like this, but judging from what others have done with rebuilt Fords you may expect a speed anywhere from 55 to 60 m.p.h.

2—This depends entirely upon how well your car is tuned up.

3—If your engine picks up quickly, no.

4—The 3 to 1 gear ratio will be all right for fast road work; for track work, ratios as low as $2\frac{1}{2}$ to 1 are used.

5—Overheated engine, broken connecting rods and pistons due to too much lightening and stuck valves.

6—By greater water-carrying capacity, scientific weight reduction in connecting rods instead of hit and miss drilling of holes, by the use of light pistons especially designed and again by proper cooling and good lubrication to keep valves from sticking.

DO NOT LENGTHEN ENGINE STROKE Ford Cylinders Can Be Rebored to 4 in. With Safety.

St. Louis, Mo.—Editor MOTOR AGE—I am planning to convert my Ford into a racer. To what size do you consider it safe and practicable to enlarge the Ford cylinders, and will this size be suitable for one of the standard sizes of Lynite pistons.

2—Is it advisable to lengthen the stroke of the Ford engine without lengthening the cylinder block?

3—Is there a crankshaft of some other make of machine of a longer stroke which could be fitted into the Ford engine?

4—Would it be advisable to counterbalance a Ford crankshaft?

5—What size do you consider advisable or customary for larger valves, and will this size correspond with a standard size of tungsten valve?

6—Where can I get the valves?

7—Is it advisable aside from the labor, and provided the job is well done, to employ semi-elliptic underslung springs all around for a Ford racer?—A. W. Meston.

1—You can safely bore the Ford cylinders to 4 in. and this will accommodate the pistons you speak of.

2—Better leave the stroke as it is. It is quite an undertaking to make a radical change in an engine and the results do not, in most cases, warrant the expense.

3—We know of no crankshaft that could be fitted to the Ford engine. One could, perhaps, be made to order but the price would be prohibitive.

4—Yes.

5—The valve ports can be reamed out to accommodate a $1\frac{1}{4}$ -in. valve and this size can be had in tungsten valves.

6—Concerns making these valves, as well as those making light pistons, etc., will be found in the advertising columns of MOTOR AGE.

7—Other things being equal, yes. We have noticed, however, that most of the Ford cars built for high-speed work keep the springing as it is, excepting that the spring perches are lowered.

Ammeter on 1915 Hercules

Mifflin, Wis.—Editor MOTOR AGE—Give instructions for wiring an ammeter on a 1915 Hercules. This has a Federal starter and motor combined.—E. J. Stacey.

As this machine is equipped with the Federal single-unit starter, having only two

Inquiries Received and Communications Answered

George W. Griffith....Martinsville, Va.
Verne Cole.....Rockford, Ill.
W. H. Beede.....Vermillion, S. D.
A. B. Thompson.....Louisville, Ky.
Clifford W. Kirkley.....Denver, Col.
Fred Weiss.....Grand Mound, Iowa
Harold D. Crocker.....South Bend, Ind.
George T. Overose.....St. Peter, Mont.
Walter Young.....Los Angeles, Cal.
Clifford Law.....Washta, Iowa
A. W. Meston.....St. Louis, Mo.
Harry H. Bruner.....Rusk, Tex.
R. C. Squires.....Evansville, Ind.
W. D. Tucker.....Hartford, Conn.
C. A. Kerns.....Aline, Okla.
L. B. Monahan.....South Sioux City, Iowa
Frederic Belle.....Fort Morgan, Col.
R. J. Stacey.....Mifflin, Wis.

leads to the battery, any indicating device put in the circuit must take both the starting and generating load. For this reason we recommend an indicator such as used by the Franklin on the Dyneto single-unit starter. However, if it is desired to use an ammeter, it will be necessary to have it sufficiently large to take the discharge of about 75 amp., while a capacity of 20 amp. charge will be more than sufficient. Any indicating instrument installed in the circuit may be placed in the main circuit of the battery, it of course being understood that a large cable will be used to complete the circuit to and from the instrument.

The Roller Smith Co., 233 Broadway, New York, make a suitable instrument.

Use No. 2 cable for connection.

WHAT COUNTERBALANCING MEANS One Can Assume that All Modern Engines Are Balanced

South Sioux City, Iowa—Editor MOTOR AGE—Would a Weldely Twelve 2% by 5 engine be too powerful for use on a Paige Stratford model instead of the Continental used?

2—What sixes besides the super-six have fully counterbalanced crankshafts? What twelves if any have fully counterbalanced crankshafts?—L. B. Monahan.

1—Not too powerful for the rest of the chassis.

2—In the first place there is no such thing as a fully counterbalanced crankshaft. The reason for this is that regardless of design, it is impossible to get the counterweights in the plane of rotation of the connecting rod. If the weights were so carried there would be no pathway through which the lower part of the rod would travel. Therefore the nearest engineers can come is to use a system by means of which the distortion factors will be reduced to a minimum. The Fekete principle as used on the Hudson car is recognized as probably the most complete system of mathematical balance that is in commercial use to-day.

On the other hand, there are a number of cars employing balance systems which are not derived from mathematical principles so much as from the law of trial and error. As an example of this we might mention the crankshaft used on the small four employed in the Woods gasoline-electric car. This is the Le Roi unit which runs continuously at speeds close to 3000 r.p.m. In this crankshaft the counterweights are probably closer to the plane of connecting-rod location than in any other shaft. The balance of these shafts is arrived at through a counterweight system which is checked by rotating a shaft while suspended from a flexible cable. There are also shafts such as the Wyman & Gordon, and those employing the curved-cheek principle which have worked out quite satisfactorily for speeds up to 2800 r.p.m. Thus you see that the question of counterbalancing is only relative and depends upon the speed of the engine. The more rapid the rotation the greater the distorting influences and hence the nearer perfection it is necessary to go in the way of counterbalancing.

An engine might have a shaft which is perfectly satisfactory at 2000 r.p.m. but which may be entirely unsatisfactory at 2800 r.p.m. and yet, owing to gear re-

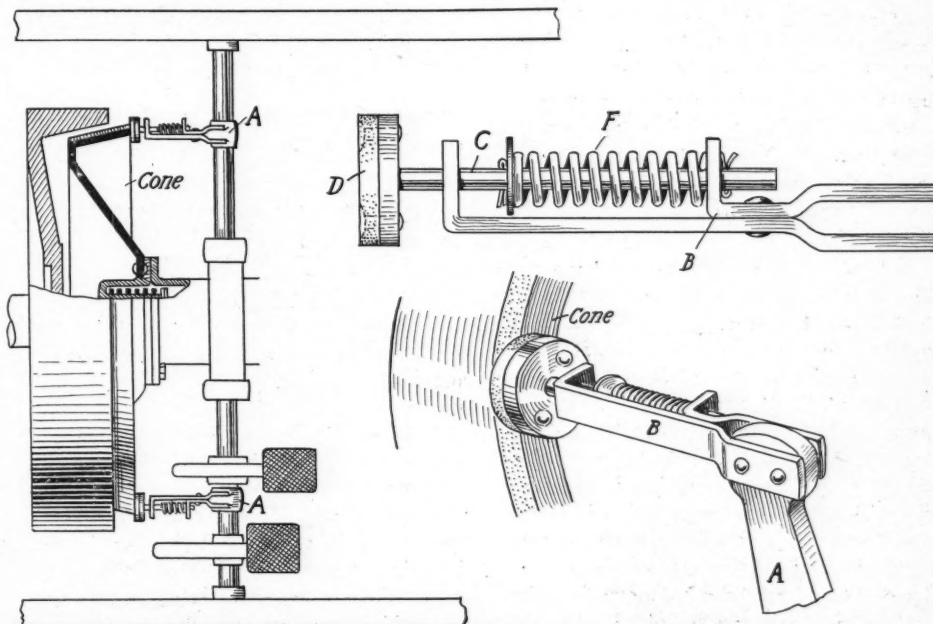


Fig. 7—Easily constructed brake to prevent cone clutch from spinning when released

duction, etc., this engine might be considered in satisfactory running balance. In this day of refinement in engine design it can be truthfully assumed that every engine manufacturer has a shaft which he considers in complete running balance for the speed at which his engine travels, and therefore you could assume that every six and every twelve is in complete commercial running balance.

Regarding fully counterbalanced shafts this, as has been pointed out, is commercially impossible. If you refer only to the Fekete principle, this is difficult to answer because we do not know what is going on in every laboratory. We do know, however, that no other cars are at present put on the market with it. The question of balancing is not a new one, as it has been with us ever since steam engines first began to be operated. It has only assumed that prominence which makes it a subject of somewhat hysterical inquiry since engine speeds ran up to 3000 r.p.m. or 2000 ft. per min. piston speed.

HOW TO CONSTRUCT CLUTCH BRAKE

Reason Why Engine of 1913 Buick Car Vibrates

Evansville, Ind.—Editor MOTOR AGE—In my model C-24 Buick what is the cause and remedy for the extreme vibration that takes place when accelerating from 5 to 20 m.p.h.? The car is in perfect condition and always has been subject to this vibration. By retarding the spark practically all the way the vibration is eliminated, but that kills the power and makes very slow acceleration. Other four-cylinder cars do not have this vibration even with advanced spark, so there must be something at fault in the design of this engine. The universal has to carry the weight of the drive shaft and housing. Would it not be better if this weight was supported in some other manner, as there seems to be excessive wear between the drive shaft and universal?

Can you suggest any way to attach a brake to the clutch cone that enables quicker gear shifting?—R. C. Squires.

The vibration you speak of is to some extent characteristic of this model Buick which was brought out in 1913. It is not due to the design of the engine but to the way in which the latter is mounted upon the frame. The engine is carried in a sub-frame which in turn is bolted to the frame of the car, and it was this method of placing the engine which resulted in some of these cars setting up vibrations when accelerating. So far as we know the company never had any trouble from undue wear between the drive shaft and universal.

A type of clutch brake we have seen used to good advantage, not on this particular car, however, is shown in Fig. 7, fastened to the clutch pedal shaft in the positions shown. Two pieces of strap iron B are bent to fit arms A and riveted together, after having first drilled holes in them for the stem C. The latter is fitted with a metal head to which is riveted a disk of leather D. A coil spring is slipped over C and cotter pins and washers inserted as shown. The two brakes should be mounted at diametrically opposite points of the clutch cone, and so placed that they will point slightly upward when the clutch

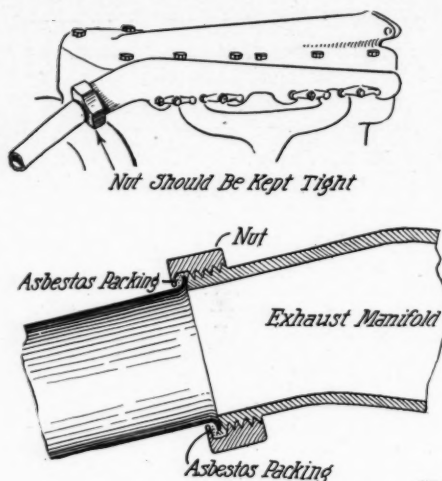


Fig. 8—Showing conventional method of connecting exhaust pipe to manifold. The packing must be tight to prevent leakage and disagreeable noise

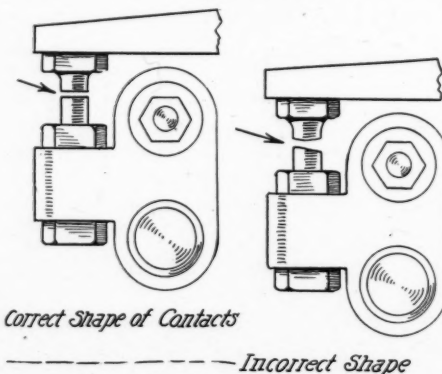


Fig. 9—Correct and incorrect shapes for magneto contact points

is in engagement. Then when the clutch is thrown out, the brakes will gradually take a horizontal position and meet the cone squarely. Further depression of the clutch pedal will cause the spindle C to be moved against the spring F, taking off the strain on the arm A and pieces B. At the same time the leather disks D will exert pressure against the cone and slow it down. It can be modified, no doubt, to fit most cars using a cone clutch. The arms A are to shift the gears more readily.

THE METHOD OF SOLDERING BRASS

Commercial Sulphuric Ether Does Not Injure Metal

Allene, Okla.—Editor MOTOR AGE—How can I make solder stick to brass and metal and what will I need for the work?

2—I have a Ford car and there is a grinding sound in the gearset. What is the cause and how can I remedy it?

3—How can I melt rubber so I can pour it?

4—Is commercial sulphuric ether injurious to metal and how?

5—There is a knock in the exhaust that is not caused by advancing the spark. What is the cause and how can I remedy it?—C. A. Kerns.

1—A solution of salammoniac and borax makes a good soldering fluid. Salammoniac—muriate of ammonia—is the natural flux for copper, and, owing to the presence of that metal in brass, it works well in fluxing that metal for soldering. There are many kinds of soldering sticks on the market which you can use for the purpose. Besides the solution or soldering stick you

will need a scraper or emery cloth to clean the parts to be soldered, and a copper bit. If the work to be soldered is very large the bit should be big enough so that it will retain the heat. Remember to have the bit hot enough when using it, as good work cannot be done with one that is too cool.

2—Grinding noises in the gearset are generally caused by gears that have become worn. You do not state whether the noise is heard when the car is on the road, or when it is standing with the engine running. It may be that some foreign matter has gotten under the bands. We would suggest that you remove the gearset cover and inspect the gears as well as the bands.

3—We know of no way to melt rubber so it will pour readily. Pure rubber becomes sticky when heated, but will not melt. The only thing you can do perhaps, is to thin it down with benzine or naphtha and make a solution of it like the common rubber cement. Rubber can be heated to make it pliable whereupon it can be molded into various shapes, but the actual pouring of it is doubtful.

4—No. Commercial sulphuric ether is made by treating alcohol with sulphuric acid.

5—The knock is probably caused by the locknut on the exhaust pipe and manifold having become loose. If this nut is not drawn up tight the end of the exhaust pipe will strike the manifold and very often produces a knock. The proper way to make this joint is shown in Fig. 8.

A RULE TO TIME MOST MAGNETOS

Method of Cleaning Circuit Breaker—Misfiring Cause

Hartford, Conn.—Editor MOTOR AGE—Give me a rule that will time all magnetos.

2—Give me a rule that applies to all carbureters in adjusting the float below the spray nozzle.

3—What causes carbureter to catch fire and give remedy?

4—How is the circuit breaker cleaned?

5—What causes misfiring when spark plugs are all right in magneto and battery ignition?

6—How are push rod bearings remedied when they are found to have side way play?

7—How do you test for an even compression on all cylinders?

8—How is a leaky metal float and water-logged cork float mended?—W. D. Tucker.

1—Practically all high-tension magnetos are so arranged that the spark takes place the instant the breaker points separate. To time a magneto of this type for a four-cylinder engine you proceed as follows: Turn the engine over until cylinder No. 1, which is the one nearest the radiator, is on the compression stroke. You can tell when the latter cylinder is on this stroke by observing the exhaust valve in cylinder No. 4 which will be lifted. Remove the cover of the distributor and turn the armature of the magneto so that the distributor arm will be on segment 1. This is the segment connected to the plug in cylinder No. 1. Place the contact breaker box in retard position and revolve the armature with the hand until the points barely begin to open, then push the armature back just a little.

It is at this point that the magneto is ready to fire cylinder No. 1, and with the flywheel on dead center, the magneto can be slipped in place.

2—There is no definite rule that applies to all carbureters. The float point is usually made adjustable so that the level of the liquid may be maintained at the most advantageous point with respect to its proper discharge from the spray nozzle. Theoretically, to secure a constant level the float point must be adjusted for different grades of gasoline, as the level of the float is dependent upon the specific gravity of the gasoline.

3—An improperly seating inlet valve will allow part of the ignited charge to enter the intake manifold, thus setting fire to the carbureter. The remedy is to see that the valve is seating properly, either by grinding it or adjusting the push rods. Carbureters also catch fire from other causes, but more often from the reasons just mentioned. Too lean a mixture causing slow firing may sometimes be responsible.

4—A good way to clean the circuit-breaker is to squirt a little gasoline in it by means of an oil can.

5—If the plugs, together with the rest of the ignition system are known to be all right, misfiring may be caused by either too weak or too rich a mixture. Misfiring

at slow speed is often caused by too weak a mixture due to having the float set too low, or by leaks in the joint where the intake manifold joins on to the cylinder block. Water in the gasoline will cause misfiring. If you suspect the magneto or battery, look for loose connections, leaking cables, dirt in breaker box or battery timer, poor adjustments of platinum points, worn roller in timer or worn fiber ring in the latter. Carbon deposits, worn push rod guides, weak or broken valve springs and a broken cylinder head gasket all make an engine run irregular or misfire. Dirt in fuel line or carbureter may be responsible.

6—If the push rod guides are fitted with bushings the latter will have to be removed and the new ones fitted. If, on the other hand, the push rods act directly against the metal of the cylinder block, the holes in the latter can be reamed out and bronze bushings forced in them. The holes in the bushings should be reamed out so that the push rods will just clear. Should you not care to go to the trouble of fitting new bushings, but merely wish to prevent the oil from working its way past the push rod guides and over the side of the engine, you can resort to the methods shown in Fig. 5.

This means, of course, taking out the camshaft to remove the push rods. The grooves can be made in the latter with a

diamond-pointed cold chisel and a three-cornered file. To finish the cut of the latter, however, use a small round file.

7—One way of doing this is to grasp the starting crank and turn the engine slowly so that each cylinder is brought up against compression and noting the amount of resistance of each. Obviously if the engine turns easier with one cylinder than another when they are on the compression stroke, the former has not the same amount of compression. The results by this method are only approximate and to get the absolute compression you must use a pressure gage which is screwed in the spark plug hole. These gages are called compression meters and sell for about \$4.

8—If there is any gasoline inside the metal float it can be detected by shaking it. The hole through which this has leaked can be detected by heating the float and passing a lighted match over the surface, which will ignite the issuing vapor. To repair it, enlarge the hole with an awl and solder it with a blowpipe, making sure that all the liquid is out of it. Use as little solder as possible. Cork floats lose their buoyancy by becoming saturated with gasoline. Such a float can be put in condition by placing it in a warm oven for a time to thoroughly dry it, after which it is given a light coat of shellac.

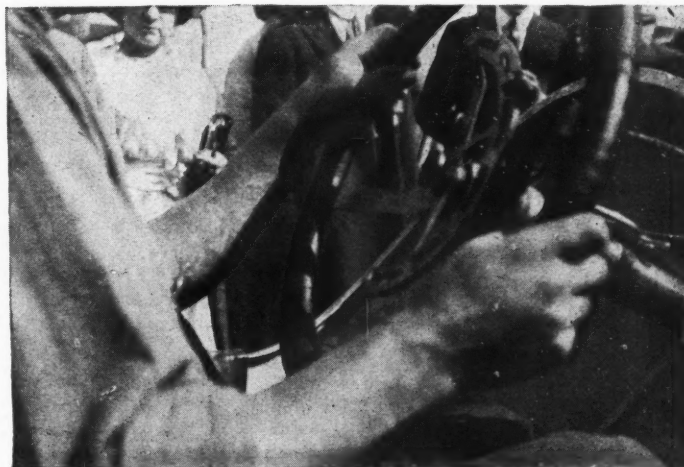
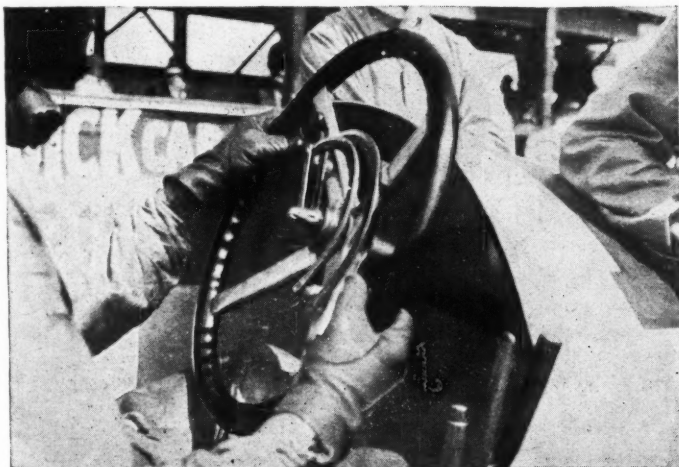
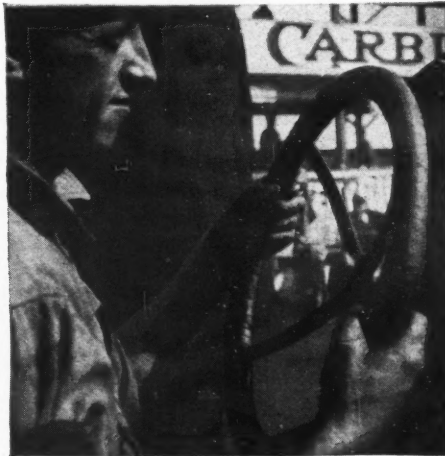


Fig. 10—Photographs specially taken to show how race drivers hold their steering wheels when traveling at high speed. Top row, left to right—Barney Oldfield, Tom Alley and Eddie O'Donnell. Bottom row—Ralph de Palma and Gil Anderson

The Motor Car Repair Shop

Grind the Valves—Save Gasoline

ILL-FITTING valves mean high gasoline consumption and low power output. Valves are not ground often enough. This seems to be due to a sort of a reverence owners hold for the operation. They seem to think it is a task requiring skill and experience. In reality it requires more patience than anything else. Patience, painstaking and perseverance, will grind valves to a perfect seat.

Carbon deposits itself between the valve and valve seat. The valve seat becomes pitted or warped from heat. When such conditions exist the valve allows gas to slip through, as shown in Fig. 1. If the intake valve is leaky there will be a flow of gas to the cylinders at each downstroke of the piston instead of on every other downstroke, and this means high gasoline consumption. Should the exhaust valve be carbonized the compression escapes with resultant weak explosion and more loss of unburned gases.

In determining whether or not valves are seating properly, turn the engine over slowly until resistance is felt. This should be done with each cylinder, and should there be little resistance it is evident that there is a loss of compression. This is not proof of the pudding, however. Insufficient clearance between the valve stem and push rod, spark plug leaks, broken piston rings, etc., will have the same effect. These should all be examined before proceeding to grind the valves.

Get Material First

The first step in grinding valves is to get the material together for the job. The usual grinding compounds are mixtures of very fine emery dust and oil. Although a good seat may be made with one grade of grinding compound, it will speed up matters to have a coarse and fine grinding agent on hand. If no special valve-grinding tool is at hand, a screwdriver or ordinary brace is suitable. The only other requisite are some clean rags and some clean gasoline.

Before the grinding operation is begun the spring which seats the valve when the engine is functioning should be removed, together with the cylinder plug above the valve, if the engine is of the side-valve, non-detachable head type, or if it be of the overhead-valve or removable-head type it will, of course, be necessary to remove the head. The valve should be taken out, and if there is any chalky deposit on the face it should be scraped off with a knife. When doing this care should be taken not to scratch the metal. If a non-detachable-head engine, the entrance to the cylinder proper below the valve should be plugged

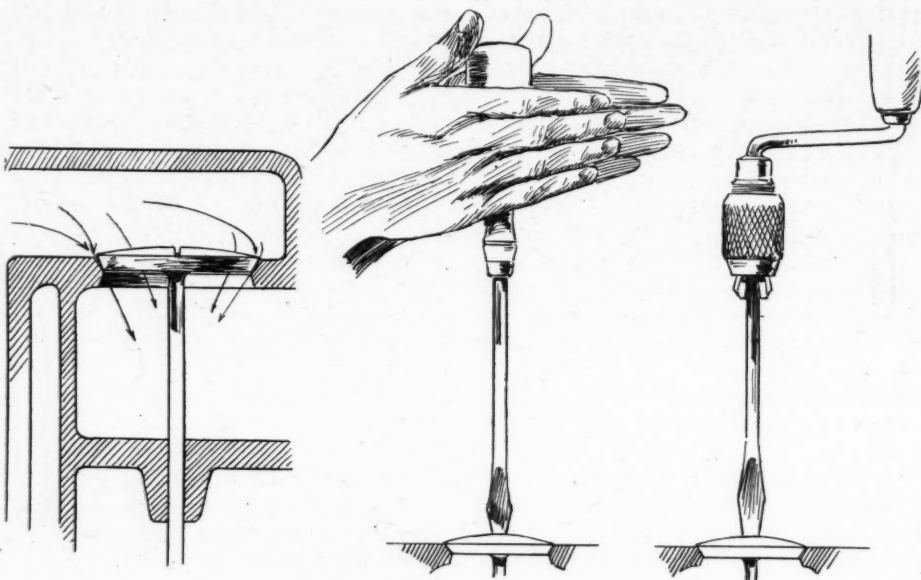


Fig. 1—The view at the left is to show how compression leaks through valves which are leaky. The other two views show two tools to use in grinding valves, and incidentally a method of holding the screwdriver in the hands

with a rag to keep the grinding compound out of the cylinders. Do not use cotton waste in this grinding process.

If you are mixing the compound yourself, put some of the coarse emery into lubricating oil in sufficient quantities so that it will stir up into a mixture about the consistency of library paste. It is easier to buy the compound from a supply store already mixed. The cost is slight because only a small amount is required. This mixture is spread lightly over the face of the valve, using a saw blade, knife or flat stick of wood. The valve is then slipped into place.

Grinding is accomplished best by turning the valve back and forth on the seat about half a revolution a little farther in one direction than in the other, and then turning the valve half about and proceeding with the operation again. All valves have a groove in the top for insertion of the screwdriver. When a screwdriver is used the handle should be placed between the palms of the hands, as shown in Fig. 1. This does not permit the valve to make a complete circle. The valve should not be pressed hard against the seat; just enough to bring the two parts in contact.

After about every dozen turns the valve should be turned half around. After grinding with the coarse mixture for about 2 min. the valve should be taken out and washed thoroughly in clean gasoline. The seat should also be washed with gasoline. If the face of the valve and the seat within

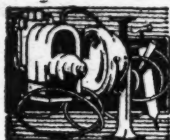
the cylinder casting are shiny all around, with no little black spots showing on the surface, the grinding is completed.

But should there appear on the face or seat a number of these blotches, the grinding should be continued with the fine emery mixture. Frequent examination, probably at intervals of 1 min., will tell one when the job is done. After each valve has been ground, remove the emery paste very thoroughly from every part upon which it may have become deposited. The importance of this cannot be overestimated. A very small quantity of the grinding compound, if it were to work into some bearing surface, would cause unnecessary wear.

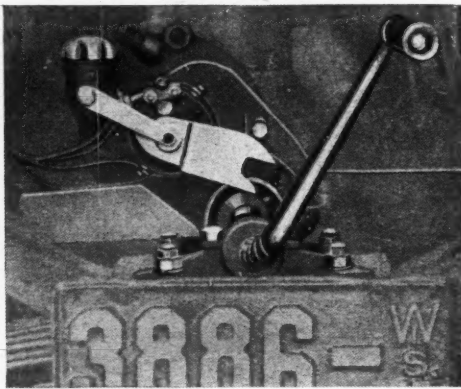
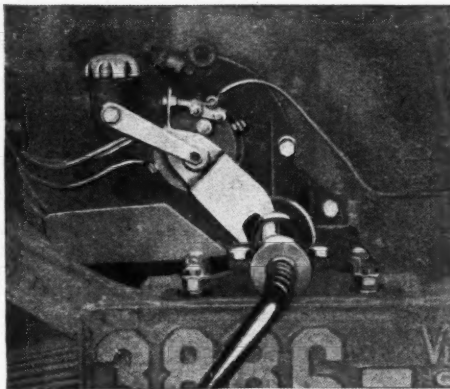
A safe way to do this in one-piece cylinder engines is to pour a half-tumbler of gasoline into each valve chamber and apply compressed air. If no air is at hand a tire pump can be used to spray the gasoline. A clean cloth should be used to wipe the inside of the valve chamber.

Buick Oil Leak Plugged

Ladoga, Ind.—Editor MOTOR AGE—I noticed many complaints in MOTOR AGE concerning the oil leaking from the timing gears of Buicks. We had the same trouble with a D-6-45. After removing the radiator we noticed the oil leaking from around the fan pulley. We disengaged the pulley and placed a small felt washer around the pulley shaft. We haven't had trouble with the oil in the 4000 miles that we have driven since. —George F. Frantz.



The Accessory Corner



Illustrations of Kant Kick spark set showing fork which holds commutator in place

Air Shield for Ford Cars

THE Franklin Rubber Co., Boston, Mass., is offering a device for Ford cars which is patented as the "Air Break for Fords" and consists of an arrangement to keep out the heat and dust in summer and the cold in winter. Illustration is given herewith. Price, \$1.

Making Cranking Safe

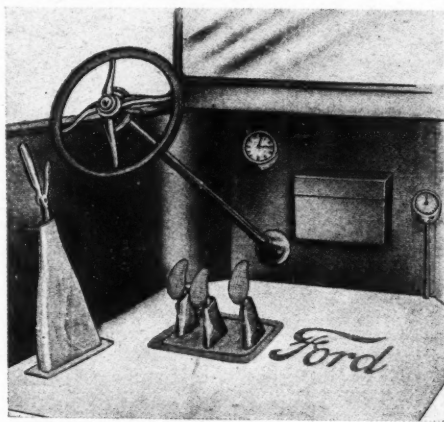
The Kant Kick Spark Set is designed to make Ford cranking safe and easy, with protection from any back-fire. It can be adjusted to any engine, it is said, and automatically sets the spark at the point of easiest starting. To attach, the device is clamped to the commutator according to directions furnished with each set. The illustrations show how the spark is set in correct and safe-starting position, so that the spark cannot be advanced while you are cranking. A small fork rides on the crank-ratchet and holds the commutator in position. Price, \$3. William Opitz, Elkhorn, Wis.

A Protector for the Battery

The Pierce battery protector indicates the condition of the fluid in the battery. A dial indicates the effect of evaporation on the level and warns when approaching the danger point. The device is designed for operation on any car and with any make of battery. The connections between the instrument and the battery are simple and quickly installed. The terminal at the battery is a spring clip which can be attached instantly to the proper connection. Price Exide Service Station, Peoria, Ill.

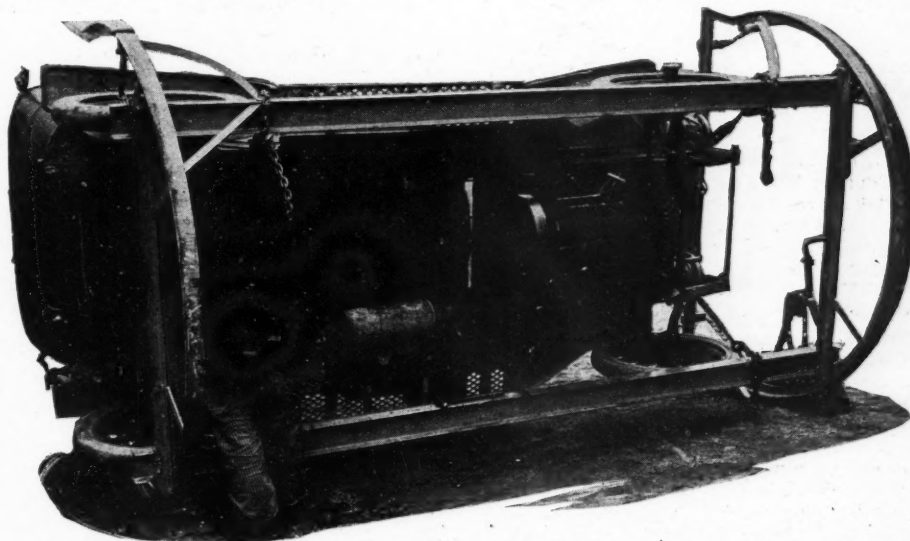
Universal Turnauto for Repair

The Universal Turnauto is a device for turning a car or truck over in repair work and assembling. A drum and cable arrangement operates by a crank attached to worm gear when the car is unable to drive



Air shields for Ford front compartment

on to the device under its own power. A derrick extends above the device to remove the engine, swinging it to one side, where it may receive attention while the car is turned over for other repairs. Turnbuckles hold the car in place, and a crank is used to turn the car to the desired angle. The car

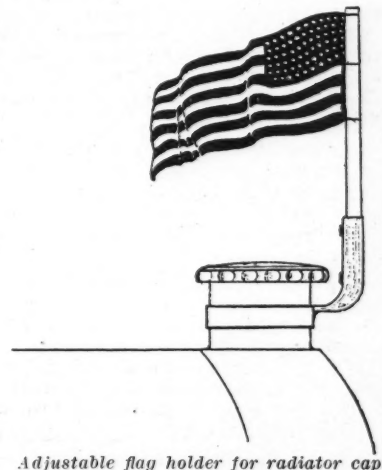


The Turnauto device in operation, showing accessibility given without tearing down car

may be suspended from the arms, or rockers, of the device while the rear system or front axle is removed for work. As the car can be held securely in any position through the crank and the arms of the device, practically any part of the car can be made accessible to a man working erect. A 5-ton truck has been turned to a vertical position by one man with this machine, it is said. The inventor is L. C. Nicoson, 412 North Harrison street, Alexandria, Ind.

Adjustable Flag Holder

The Shattuck adjustable flag and pennant holder is designed to fit all passenger and commercial motor cars. It is fastened to the filler tube of the radiator by a band arrangement which is locked in place by the fingers. Two or more flags may be used. The device takes flags with staffs up to and including 1/4-in. in diameter and does not interfere with the removal or replacement of the radiator cap. The finish is black enamel. Price, 25 cents. Shattuck Mfg. Co., New York.



Adjustable flag holder for radiator cap

From the Four Winds



WHEN ADVERTISING CLUBS MOTOR—May 20 the San Francisco Advertising Club will be coming east with this prairie schooner truck which is to bear the supplies and extra equipment. The motor caravan is to demonstrate fast travel over western roads by making 200 miles a day

GEORGIA Registers More Than 50,000—More than 50,500 1917 tags have been sold in Georgia. The total license fund on hand is about \$175,000. The reserve fund to be set aside from this, under the provisions of the law, is about \$50,000.

Circus Buys Willys-Knights—The United States Circus Corp. has purchased fifteen cars from the Willys-Overland Co. The purchase includes five 1200-lb. delivery wagons, three roadsters and Willys-Knights fours and eights.

Farm Land for Lansing Workers—R. H. Scott, general manager of the Reo Motor Car Co., and W. K. Prudden of the Prudden Wheel Co., are active in a plan to obtain 1500 acres of land near Lansing which will be tilled by the employees of the various motor car and parts factories at Lansing.

Steals Diamonds from Factory—William E. Masters, a man with a record of several prison sentences and an employee of the Ford Motor Co., Detroit, has been arrested for stealing \$27,000 worth of diamonds used for trimming emery wheels in the Ford plant. He has admitted his guilt.

Bad Roads No Bar—How he traveled 2779 miles from Freeport, N. Y., to Minneapolis, Minn., over roads in which his car sank to the running boards in ooze and mud, in his Overland five-passenger touring car, is told by J. A. Asch, Brooklyn, N. Y. The trip used 157 gals. of gasoline, an average of 18 m.p.g. The car averaged 190 miles a day, and \$1.15 paid the repairs.

Philadelphia Considers War Roads—The board of directors of the Philadelphia chamber of commerce, on the recommendation of the good roads committee, has approved a resolution calling for a state appropriation of \$3,384,000 for the construction and improvement of roads around Philadelphia for purposes of war. The 188 miles of highway centering in this city, the improvement of which is recommended, would not be in fit condition to bear the heavy motor truck traffic active warfare would occasion. The highways suggested are those leading to

Morrisville, Chester, Coatesville, Reading, Allentown and Bethlehem.

Illinois May Adopt Red Street Lights—Streets of Illinois are to be decorated with a series of warning red lights, if a bill introduced in the Senate by Harold Kessinger becomes a law. The measure provides that red colored globes must be maintained in cities where there are street car tracks, the lights to be placed at street intersections for the

guidance of motorists and drivers of horse propelled vehicles.

To Build Sherman-Sheridan Road—The Sherman-Sheridan Highway Co. has been incorporated to build a highway from Cincinnati, Ohio, through Southern Ohio to Wheeling, W. Va. The incorporators are officers of the Cincinnati Automobile Club, which is backing the highway project.

New York Considers Doubled Tax—To meet the estimated cost of the state government New York leaders have agreed to raise \$2,000,000 more in motor taxes. According to the bill, registration fees will be twice as large. Omnibuses and motor trucks are excluded. The bill was introduced by the committee on taxation and retrenchment.

Seattle Dealers Fly Flags—At a recent meeting the Seattle Automobile Dealers' association trustees passed a resolution calling upon all dealers in the city to fly the American flag either above their business houses or in their salesrooms. As a result, a trip along the row seems like motoring beneath an arcade of Old Glories.

To Organize Boys as Drivers—I. H. Stern of the Louisville Automobile Supply Co., Louisville, Ky., will organize for the Louisville Automobile Club a mechanics' corps composed of boys too young to be drafted who are able to handle motor cars. The members will serve in case the 200 cars pledged by the club members are requisitioned by the Government.

Trucks Ink from Jersey to Boston—The situation in Boston as to the paper and ink supply became so acute that motor trucks were resorted to in transportation. William McCullough was called on to deliver 6 tons of ink to a Boston newspaper and made the trip from Jersey City, N. J., to Boston in one of his fleet of 5 and 6-ton Gramm-Bernstein trucks. The trip was made without mishap in 30 hrs.

Hankow, China, Has Fifty-eight—At the close of 1916 fifty-eight motor cars were registered in Hankow, China. All the cars in use there are exclusively for traffic within the concessions. This is an increase of fourteen over 1915. Of the cars registered thirty-five were American, eleven French, nine British and three German makes. The customs reports for 1916 show a valuation of \$15,303 in cars and a total import of twenty.

A Truck That Earns Its Keep—H. M. Tower, New Haven, Conn., is a coal and wood dealer and owns a Signal truck which practically pays for operating his business by cartage for other concerns in spare time. One week the total cost of operating the truck, including labor of three men, \$48; 58 gals. of gasoline, \$13.34, and 4 gals. of oil, \$1.40, was \$62.74. The receipts from extra work were \$59.20. So Tower's operating expenses for his own business was only \$3.54.

Cadillac Hauls Heavy Gun—The Cadillac Eight, manufactured by the Cadillac Motor Car Co., recently won highest honors in a series of tests arranged by the Japanese army. Representatives of five American cars were invited to enter a competitive demonstration. When all had finished the officers asked each one to haul a nearby gun up a steep grade. The gun weighed 2½ tons. Three of the dealers declined to compete, the fourth ruined his frame in the attempt, and the Cadillac then was attached to the gun, got it under way in low gear, shifted to second speed and negotiated the grade.

Coming Motor Events

CONTESTS —1917—

May	10—Uniontown, Pa., speedway.
May	19—New York, speedway.
May	30—Walla Walla, Wash., track.
May	30—Uniontown, Pa., speedway.
May	30—Cincinnati, Ohio, speedway.
June	16—Chicago, speedway.
June	23—Cincinnati, Ohio, speedway.
July	4—Visalia, Cal., road race.
July	4—Spokane, Wash., track.
July	4—Benton Harbor, Mich., track.
July	4—Uniontown, Pa., speedway.
July	4—Tacoma, Wash., speedway.
* July	4—Omaha, Neb., speedway.
July	15—Missoula, Mont., track.
July 17-19	—Intercity Reliability.
July	22—Anaconda, Mont., track.
July	29—Great Falls, Mont., track.
Aug.	5—Billings, Mont., track.
* Sept.	3—Cincinnati, Ohio, speedway.
Sept.	6—Red Bank, N. J., track.
Sept.	8—Pike's Peak, Colo., hill climb.
* Sept.	15—Providence, R. I., speedway.
Sept.	22—Allentown, Pa., track.
Sept.	28—Trenton, N. J., track.
* Sept.	29—New York, speedway.
Sept.	30—Uniontown, Pa., speedway.
Oct.	6—Uniontown, Pa., speedway.
Oct.	6—Danbury, Conn., track.
* Oct.	13—Chicago, speedway.
Oct.	13—Richmond, Va., track.
Oct.	27—New York, speedway.

* A. A. A. Championship Award Event.



Among the Makers and Dealers



PHIPPS is in Orient—H. B. Phipps, export manager of the Hudson Motor Car Co., is traveling in the Orient.

Twelve Maxwells Daily at St. Louis—The Maxwell Motor Car Co. assembling plant here is now turning out twelve complete Maxwells daily.

Alfont Superintendent for Jones—M. L. Alfont has become superintendent of the factory of the Jones Motor Car Co., Wichita, Kan.

Palmerlee Joins Chalmers—J. D. Palmerlee has joined the Chalmers Motor Co. as district representative. He was formerly southwestern district manager for the Hudson Motor Car Co.

Waukesha Motor to Expand—The Waukesha Motor Co., Waukesha, Wis., is planning to erect a new administration building to include the experimental shop. The building is to be 44 by 88 ft., two stories and basement.

Cleveland Companies Build—The Peerless Motor Car Co. will build a dry kiln building, 42 by 140 ft., and the Chandler Motor Car Co. plans a \$5,000 conveyor. Both are at Cleveland, Ohio.

Ford Buffalo Branch Changes—H. E. Partidge has resigned as manager of the Ford assembly plant at Buffalo. George B. Tyler succeeds him. Mr. Tyler was formerly manager of the Ford Sioux City, Iowa, assembly plant.

Chalmers Buys Ontario Land—The Chalmers Motor Co. has purchased 6 acres of factory land from the city of Windsor, Ont., and will erect a two-story factory. This building will replace the one recently destroyed by fire.

Nash Ships First Trainload—All records for individual shipments of Jeffery trucks were broken by the Nash Motors Co. this week, when it dispatched a solid trainload of twelve Jeffery quads and twenty-eight Jeffery all-purpose trucks to the H. Barcroft White Corp., Syracuse, N. Y.

Tower Producing Trucks—The Tower Motor Truck Co., Greenville, Mich., has started operations in its new plant and expects to turn out 100 machine this year. The first truck has been completed and delivered to the Greenville fire department. It is equipped with two 40-gal. chemical tanks, automatic hose reel and 200 ft. of hose.

Grant to Expand Building—The Grant Motor Corp. has purchased additional land adjoining its present new plant at Cleveland, Ohio, and will build several buildings at a cost of \$500,000. One building will be 647 ft. by 160 ft. and another 400 ft. by 160 ft. In addition there will be a new office building 40 ft. by 160 ft.

Aluminum Castings to Build—The Aluminum Castings Co., with headquarters at Cleveland, Ohio, has disposed of its present plant at Manitowoc, Wis., to the Aluminum Goods Mfg. Co., Manitowoc, Two Rivers, Wis., and Newark, N. J., and will build a new plant at Manitowoc, which will cost more than \$250,000. The main shop will be 200 by 300 ft. and is to be ready about Sept. 1.

Dealers Receive Rebate—The members of the Automobile Trade Association of Indianapolis, Ind., at a recent meeting voted a rebate of 60 per cent of the cost of the show space to all dealers in good standing. The association voted also to aid the awakening of patriotism movement started by the chamber of commerce and contributed \$1,200 in pledges toward the movement. A commit-



WHEN PATRIOTISM RUNS HIGH—The American flag is hanging all over the Briscoe factory. Men in charge of this stock room have decorated the aisles thus. The employees have been contributing for the purchase of flags ever since war was declared. The flags are used as decorations

tee was appointed to solicit further subscriptions.

Collins Leaves Parker Rust-Proof—Bert Collins, general sales manager of the Parker Rust-Proof Co., has resigned.

Armbrust Leaves Ben Hur—C. R. Armbrust has resigned from the Ben-Hur Motor Co., Cleveland, Ohio, effective May 1. He was chief engineer and consulting engineer.

Ford Has Record Day—On Thursday, April 26, the Ford Motor Co. produced 3100 cars, the biggest day in its history. It is stated that April will be the biggest production month the company has experienced.

Radoye Joins Packard—G. U. Radoye, who recently resigned from the Hudson Motor Car Co., has been appointed assistant manager of the carriage sales department of the Packard Motor Car Co.

Canadian Ford to Build—The Ford Motor Co. of Canada, London, Ont., will build a plant costing \$150,000. It plans to install a complete plant for enameling bodies, including large ovens.

Kerston Leaves Studebaker—Harry Kerston has resigned from the Studebaker corporation as designing engineer. He is associated with a company to make the Kerston Gas-Electric car.

Goodyear to Farm 700 Acres—The Goodyear Tire & Rubber Co., Akron, Ohio, has set aside 700 acres of land to be cultivated for beans, onions, wheat, corn and peas. Goodyear Hall, the \$450,000 gymnasium, may not be erected until after the war.

Storle Engine Co. Organizes—O. O. Storle, Kewaunee, Wis., inventor and designer of several new types of internal combustion engines, who has been manufacturing motors on a small scale for several years, has organized the Storle Engine Co., with an authorized capital of \$50,000, to establish a large plant at once. The new company has elected officers as follows: President, O. O. Storle;

vice-president, H. O. Granberg; secretary, O. L. Pierpont; treasurer, Wenzel Heck.

Independent Motor Moves—The Independent Motor Co. has moved to Conneaut, Ohio, from Port Huron, Mich. It will employ 300 men.

Saginaw Enlarges Plant—The Saginaw Auto-Kamp Co., Saginaw, Mich., is enlarging its plant and will increase its production to twenty-five trailers a day.

Body Company Incorporated—The Saginaw Auto Body has been incorporated with a capital of \$100,000 to manufacture motor car bodies. The company has purchased a plant and will start production soon.

Archibald Gets Maxwell Promotion—J. R. Archibald has been promoted to be district sales manager of the Maxwell Motor Car Co. in Winnipeg and will be the manager of the Alberta and Saskatchewan districts.

Napoleon Plant Is Sold—The Napoleon Crown Fender Co., Napoleon, Ohio, capital \$20,000, has been sold to C. D. Peifer, of Fostoria, Ohio. Its entire output will be taken by the Allen Motor Car Co., Fostoria.

Smith Form-a-Truck in Canada—The Smith Motor Truck Corp., maker of Smith Form-a-Truck, is established now in its new quarters at Toronto, Ont. This branch will handle the Smith Form-a-Truck in Canada. M. H. Stratton is general sales manager for Canada and H. W. Patterson has charge of the Toronto and district office.

Canadian Invents Carbureter—A carbureter which supplies itself with fuel from a tank at a lower level than itself has been invented by Ernest A. Hall of Hall Motors, Ltd., Toronto, Ont. Mr. Hall has been specializing on carbureters for the last six years and says he has received several offers from American manufacturers to purchase the rights, but that he is taking his time in deciding who to deal with. He expects to go to Chicago soon with his invention, if

pending negotiations are concluded satisfactorily.

To Make Tire Pump—The Double Action Tire Pump Co., Lynchburg, Va., has been formed with a capital of \$50,000.

Crow to Build in Ontario—The Crow Motor Co. will erect a plant at London, Ont., to cost \$100,000.

North American Motor to Build—The North American Motor Co., Pottstown, Pa., has let a contract for a factory and office building, to cost \$100,000.

New Motor Car Company—The Thibert Mfg. Co., Worcester, Mass., has been incorporated with a capital of \$50,000 to manufacture motor cars. N. R. Thibert is president and treasurer.

Atwater-Kent to Build—The Atwater-Kent Mfg. Co., Philadelphia, Pa., ignition manufacturer, has awarded a contract for the erection of a two-story building, to cost \$75,000. The building will be 14 by 217 ft.

Sangbush to Columbia Motors—Frank E. Sangbush has been appointed office sales manager of the Columbia Motors Co. Mr. Sangbush has been with the Abbott-Detroit Motor Car Co.

Collins Leaves Maxwell—J. R. Collins has resigned from the Maxwell Motor Car Co. to become vice-president and treasurer of an eastern concern. He was assistant general auditor.

Douglas Joins Standard Parts—Herbert J. Douglas has joined the Standard Parts Co., Cleveland, Ohio, in its accounting department. Mr. Douglas has been with the Sherwin-Williams Co. for fourteen years, lately as comptroller.

Fitzjohn Joins Hayes-Ionia—Harry H. Fitzjohn has been appointed director of purchases for the Hayes-Ionia Co., Grand Rapids, Mich. Mr. Fitzjohn was formerly purchasing agent for the Springfield Body Corp. and resigned to assume his new duties.

BeSaw Tire Expands—BeSaw Tire & Rubber Co., Canton, Ohio, is planning an increase in its tire output from 150 to 500 tires a day. The capital is to be increased from \$220,000 to \$1,000,000. New buildings are being planned. About 200 additional men will be used.

Revere Company Builds—Work has started on the construction of the buildings for the Revere Motor Car Co., Logansport, Ind., which will assemble the Revere car, using a Duesenberg engine. The buildings will have a floor space of 33,000 sq. ft. and the plant will have a capacity of 2500 cars yearly.

Richards Goes to Detroit—G. A. Richards has been appointed special representative for the Firestone Tire & Rubber Co. sales department in the Detroit territory. He has been with the sales department for seven years. During the last three years he has occupied positions as branch manager at Columbus, Ohio, and Pittsburgh, Pa.

New Plant at Fostoria—The Fostoria Pressed Steel Co., Fostoria, Ohio, has been incorporated for \$100,000 by W. C. Allen, C. D. Pifer and Henry Rothcock. The company will supply all the steel work for the building of the Allen car and for steel needed in the Dale Body Co., which manufactures the bodies for the Allen.

Bittel-Leftwich to Sell Wholesale—The Bittel-Leftwich Tire & Service Co. has changed its name to the Bittel-Leftwich Co. and will open a wholesale and retail accessory department. The company has confined its operations to Lee tires, wholesale and retail, and was the first of the tire companies to install a 24-hr. service in St. Louis. A two-story building, containing 12,000 sq. ft. of floor space, is being erected. C. H. Shuptrine, formerly in charge of the accessory department of the Grand-Leader department

store, is the manager. The company has branch stores at Springfield and Decatur, Ill.

To Manufacture Semaphore Signal—Joseph B. Merwin, sole owner of the National semaphore signal, will build a factory at Wichita, Kan., for its manufacture.

Mansfield Reaches 1000 Mark—The Mansfield Tire & Rubber Co., Mansfield, Ohio, has reached the mark set a week ago in making 1000 tires and 1000 inner tubes in 24 hrs.

Buildings for Republic—The Republic Motor Truck Co., Alma, Mich., is erecting three new buildings, which will aid materially to increase its output. Two of the new buildings will be of brick and the third will be a frame structure.

Lexington, Ky., Dealers Organize—The Lexington, Ky., Automobile Dealers' Association has been organized with the following officers: Thomas B. Dewhurst, president; S. B. Featherstone, vice-president; W. R. McDonald, secretary, and C. W. Howard, treasurer.

Truck Company Incorporated—The Consolidated Truck & Tractor Co. has been incorporated in Michigan by Z. C. Barber and Forest M. Keeton to manufacture and sell truck attachment designed by Mr. Keeton. Mr. Keeton was formerly a member of the Keeton Motor Car Co.

Lampson May Move to Matteson, Ill.—The Lampson Motor Truck Co., Chicago, is negotiating with business men of Matteson, Ill., for the location of a factory. The company asks a bonus of \$30,000 and subscriptions of \$25,000 in stock. A plant to cost

\$100,000 is promised, employment to be given to 1000 at the outset. Elkhart, Ind., is said to have offered a tract of 26 acres of land and a building.

Allen to Manage Fuller Sales—Gould Allen has been appointed sales manager for Fuller & Sons Mfg. Co., Kalamazoo, Mich.

Ghent Motor Moves Offices—The Ghent Motor Co. has moved its executive offices from Chicago to the plant at Ottawa, Ill.

Lawrence Welders Open Another Branch—L. Lawrence & Co. have opened a New York branch in addition to the Chicago, Detroit and Newark, N. J., branches.

Trucks for the Red Cross—The Federal Motor Truck Co. has received orders for four 3½-ton trucks for the American Red Cross and four 3½-ton trucks for the Red Cross service in Belgium.

Duplex Engine Opens Branch Offices—The Duplex Engine Governor Co., Inc., Brooklyn, N. Y., has opened branch offices in Detroit and Chicago. Ludwig Arnson is in charge at Detroit; J. E. Simond, Chicago.

Lawrie Leaves Spacke Company—Frederick S. Lawrie, sales manager of the Spacke Machine & Tool Co., Indianapolis, Ind., has resigned and will give his attention to a selling agency in Indianapolis. Mr. Lawrie had been with the sales department ten years.

Schafer Sales at Detroit—The general sales department of the Schafer Ball Bearings Co., Inc., has been established in Detroit, with G. W. Fowler, sales manager, in charge. The company has its factory at Hawthorne, N. J. All sales and advertising will be handled from Detroit.

Changes at Ross Gear Plant—J. N. Kelly has resigned as superintendent of the Ross Gear & Tool Co., Lafayette, Ind., maker of steering gears. E. L. Usner has been made assistant manager; J. P. McParland, superintendent of machine shops, and M. C. Griswold, superintendent of assembly.

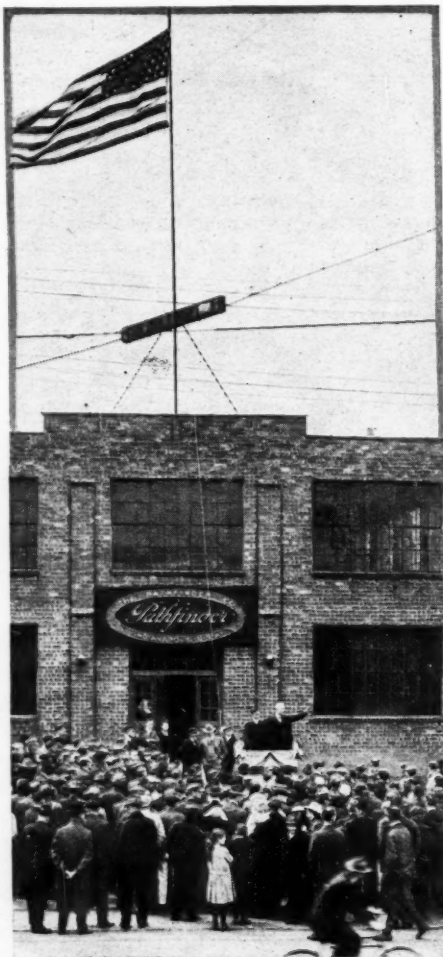
Doble Agents in Detroit—The Owen, Graham & Starkweather Co. will market Doble steam cars in Detroit territory. Mr. Starkweather will have the active management and sales direction and will continue his present position as branch manager of the Buick Motor Co.

Davis Mfg. Co. Expands—The Davis Mfg. Co., Milwaukee, Wis., manufacturer of gasoline engines, is completing work on a machine shop addition which will double its facilities and May 1 broke ground for a foundry addition, 100 by 300 ft., which will double the casting capacity.

Cassidy to Sell Du Bois Rings—The Edward A. Cassidy Co., New York, has been appointed sales manager for the Tenion ring, which is produced by the Du Bois Piston Ring Co. The Tenion is not a new ring, but has been known as the Du Bois piston ring and is used as standard equipment on all Sterling motors.

To Sell Doble in Indiana—The Indiana Doble Steam Car Co. has been organized to distribute the Doble car in Indiana and a part of Illinois and Michigan. R. V. Law of the Hulett-Law Motor Car Co., Indiana distributor of the Hudson Super-Six, is head of the company.

Boone Tire Expanding at Eau Claire—The Boone Tire & Rubber Co., Sycamore, Ill., and Des Moines, Iowa, has begun the erection of a third complete factory group at Eau Claire, Wis. The first unit will be a one-story and basement structure, fireproof, 60 by 180 ft., with a separate boiler house and office building. The structure will cost \$20,000 and the equipment about \$50,000. Ultimately the Eau Claire group will consist of four buildings of the same size, forming a hollow square. It is hoped to start actual manufacturing operations by Aug. 1.



HOLDING FLAG CEREMONIES—Governor James P. Goodrich of Indiana giving an address at flag raising celebration at the Pathfinder plant